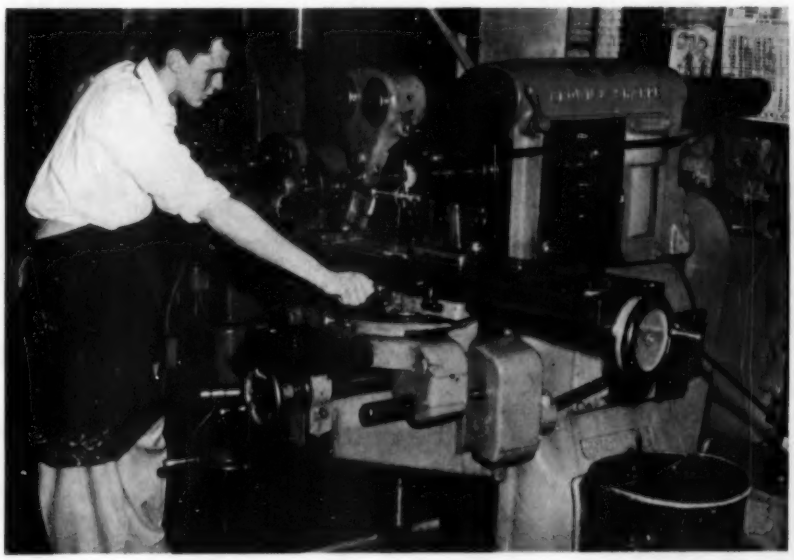
Volume 48, No. 5 May, 1959

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION



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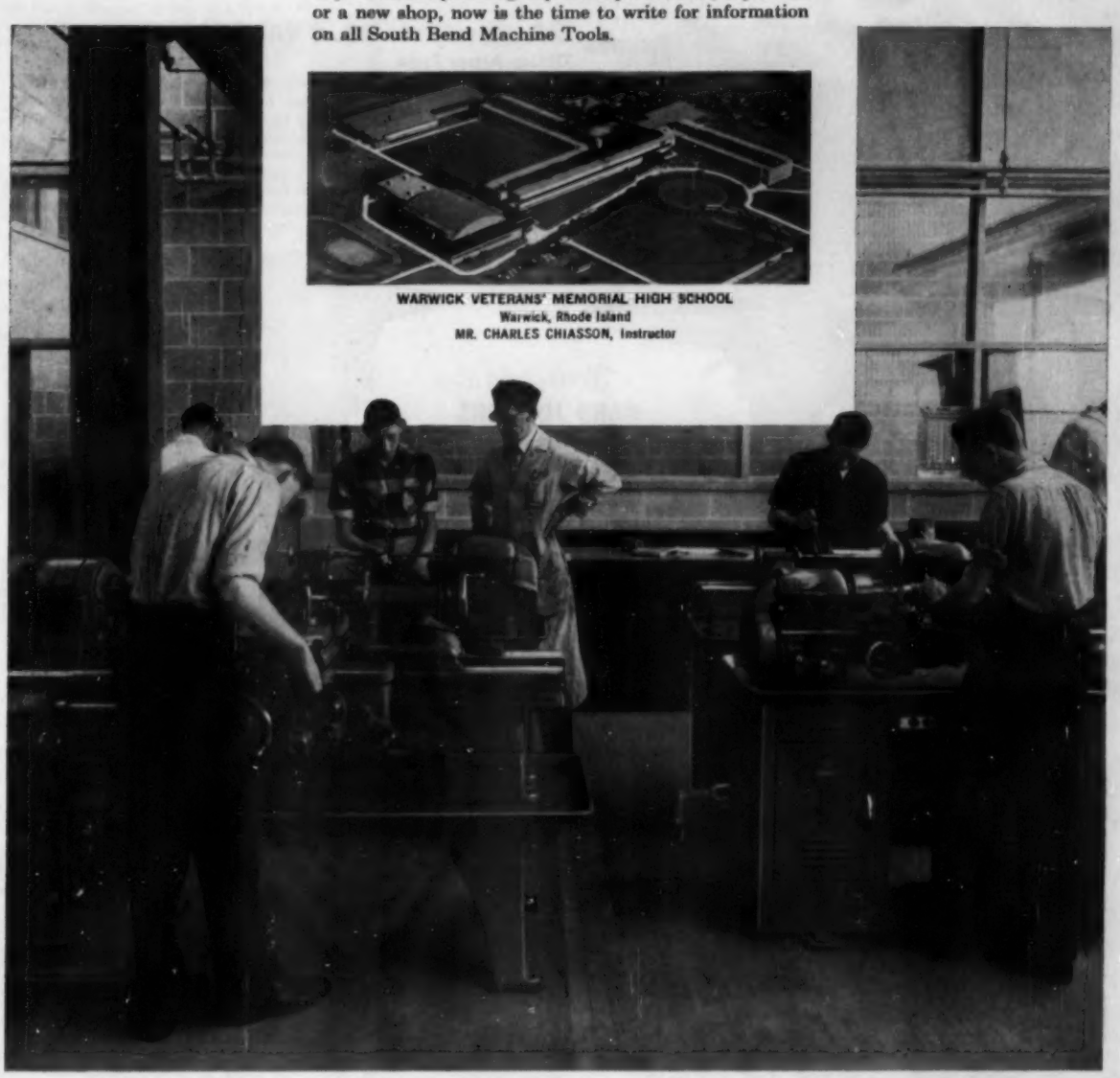

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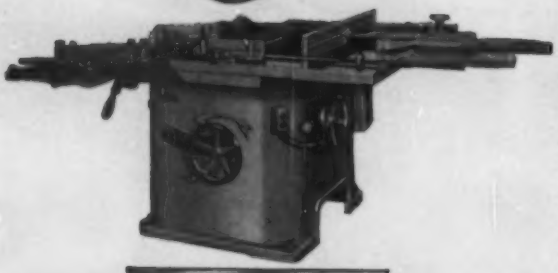

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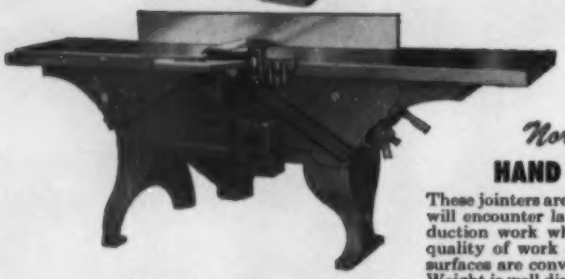

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MAY
1959

VOL. 48 NO. 5

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

Published on the 15th of the month preceding the date of issue by THE BRUCE PUBLISHING CO., 400 North Broadway, Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 232 Broadway, New York 7, N. Y.

This Month's Cover

The student shown in this month's cover picture is working at a milling machine in the machine shop class at the Jules E. Mastbaum Vocational-Technical School at Philadelphia, Pa. This school opened in 1929 and is the oldest public school of its type still active in that city.

The picture was sent to us by Benjamin J. Novak, Frankford High School, Philadelphia, Pa.

Summer School

May we recommend that you plan your summer school schedule now? For a list of schools offering work during the summer time, see our list on page 151 of this issue.

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Subscription Information. — Subscription price in the United States, U.S. possessions, and Canada, $3.75 a year, payable in advance. In all foreign countries, $4.75. Single copies, 50 cents. March School Shop Annual, $1.00.

Discontinuance. — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for upon publication. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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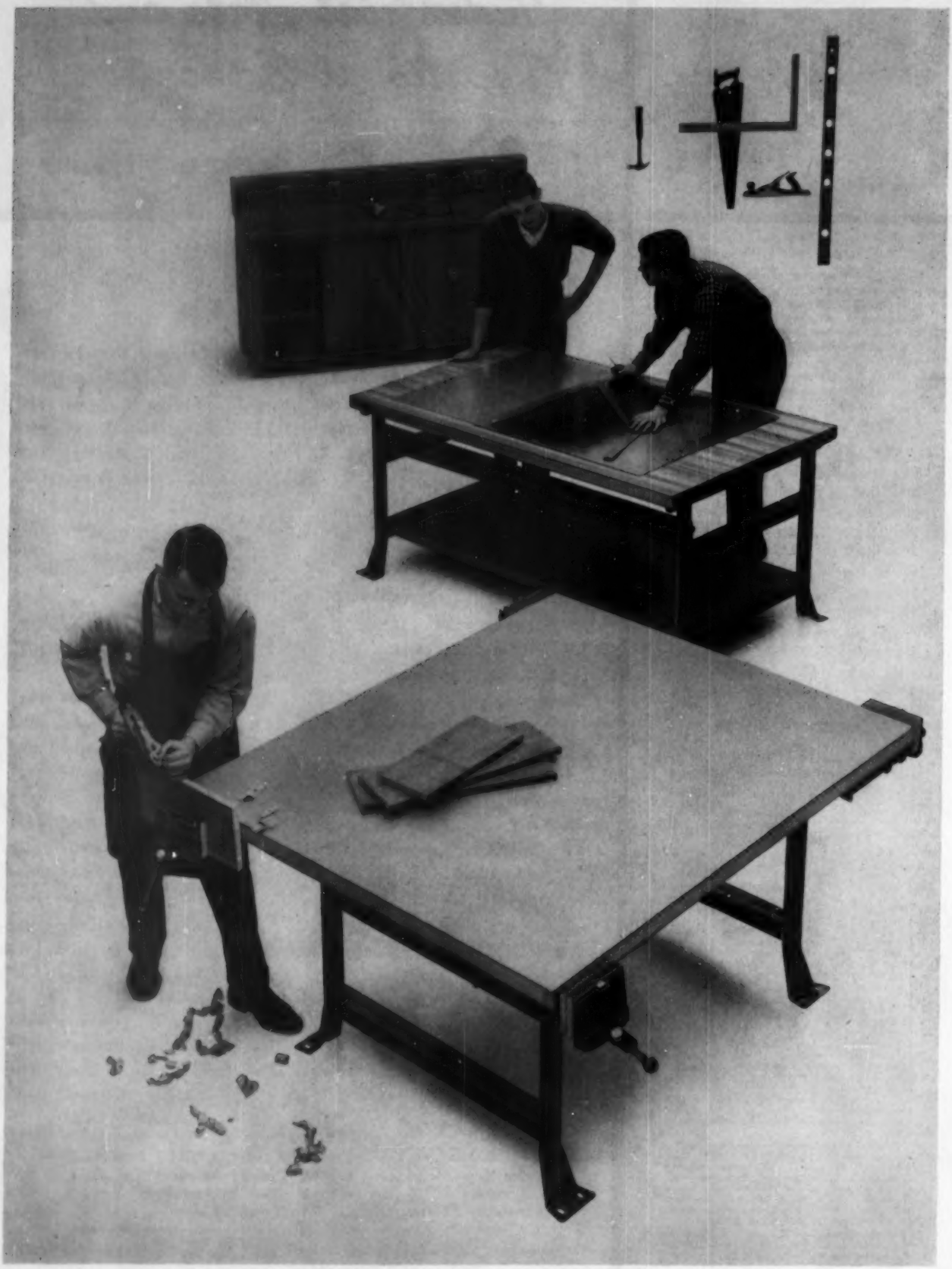

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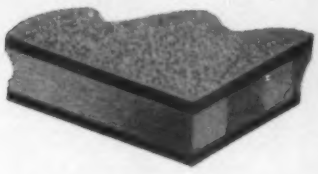

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Association News

COMING CONVENTIONS

Apr. 30–May 2. Wisconsin Association for Vocational and Adult Education, at Northland Hotel, Green Bay, Wis. Secretary, C. D. Rejahl, 211 North Carroll St., Madison, Wis.

May 1–2. Colorado Industrial Arts Association, at Colorado State University, Fort Collins, Colo. Secretary, Jesa Schmitt, 2549 West 73 Rd., Westminster, Colo.

May 7–8. Oswego Industrial Arts Spring Conference, at Teachers College, Oswego, New York. Program chairman, Arthur Hauler, Teachers College, Oswego, New York.

May 31–June 5. Wyoming Vocational Agriculture Teachers Association, at Jackson, Wyo. Secretary, Clark Allen, Cheyenne, Wyo.

June 8–12. Idaho Vocational Association, at Idaho State College, Pocatello, Idaho. President, Mrs. Helen Morgan, Burley, Idaho.

June 23–25. Pennsylvania Vocational Association, at Eagles Mere Hotel, Eagles Mere, Pa. Robert Sauter, Fairview, Malvern R.D. No. 2, Pa., or Robert E. Evans, Bradford County Schools, (Court House), Towanda, Pa.

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NEW JERSEY VOCATIONAL AND ARTS ASSOCIATION

The New Jersey Vocational and Arts Education Association held its 41st Annual Convention at the Berkeley-Carteret Hotel in Asbury Park, N. J., on March 19 to 21, 1959.

Spearheaded by a fifty per cent increase over last year's membership and a theme of "Vocational and Arts Education in Action," the activities began on Thursday with an associated program for directors, supervisors, apprentice co-ordinators, and guidance counselors under the direction of the vocational division of the State Department of Education.

Thursday evening's general meeting was under the direction of Albert E. Jochen, New Jersey Assistant Commissioner for Vocational Education, who presented Roger B. Cole, Jr., of the Jersey Central Power and Light Company, whose lecture and demonstration on light was given to a large audience of teachers and supervisors in the vocational, industrial arts home economics, fine arts, printing, and guidance areas of education.

At the general meeting on Friday, members and guests were greeted by Philip H. Haney, NJVAEA President, who introduced Florence Heal, first vice-president and chairman of the program.

She presented the moderator, Frank B. Stover, assistant commissioner on research, and a panel consisting of Burr D. Coe, James H. Johnson, Paul R. Jones, Douglas Tatton, and Robert Worthington, who discussed "Vocational and Arts Education in Action in New Jersey" in the vocational, agriculture, home economics, fine arts, and industrial-arts fields of education.

New officers consist of: president, Florence Heal, home economics instructor; first vice-president, Leonard Skolnick, industrial arts instructor; second vice-president, Willard Vroom, printing instructor; third vice- president, Burr Coe; treasurer, Edmund A. Boyer, Jr.; and secretary, Richard O. Harthmann, industrial-arts supervisor.

A fellowship luncheon sponsored jointly by the Nu and Omicron Chapters of Epsilon Pi Tau was held at noontime in the Casino Room. The co-chairmen were Henry H. Albrecht, Nu Chapter of Rutgers; and Arthur Earl, Omicron Chapter of Montclair State College.

Afternoon business consisted of sectional meetings held by the Academic Subjects, Automotive and Metal Trades, Building Trades, Culinary Trades, Graphic Arts, Guidance and Placement, Home Economics, Industrial Arts, Science and Technical, I.A. Supervisors, Women's Occupations, New Jersey Industrial Arts Association, and the New Jersey Section of the AVA.

Dr. R. C. S. Young, public relations department, General Motors, Detroit, was the principal speaker at the annual banquet in the Crystal Terrace Room.

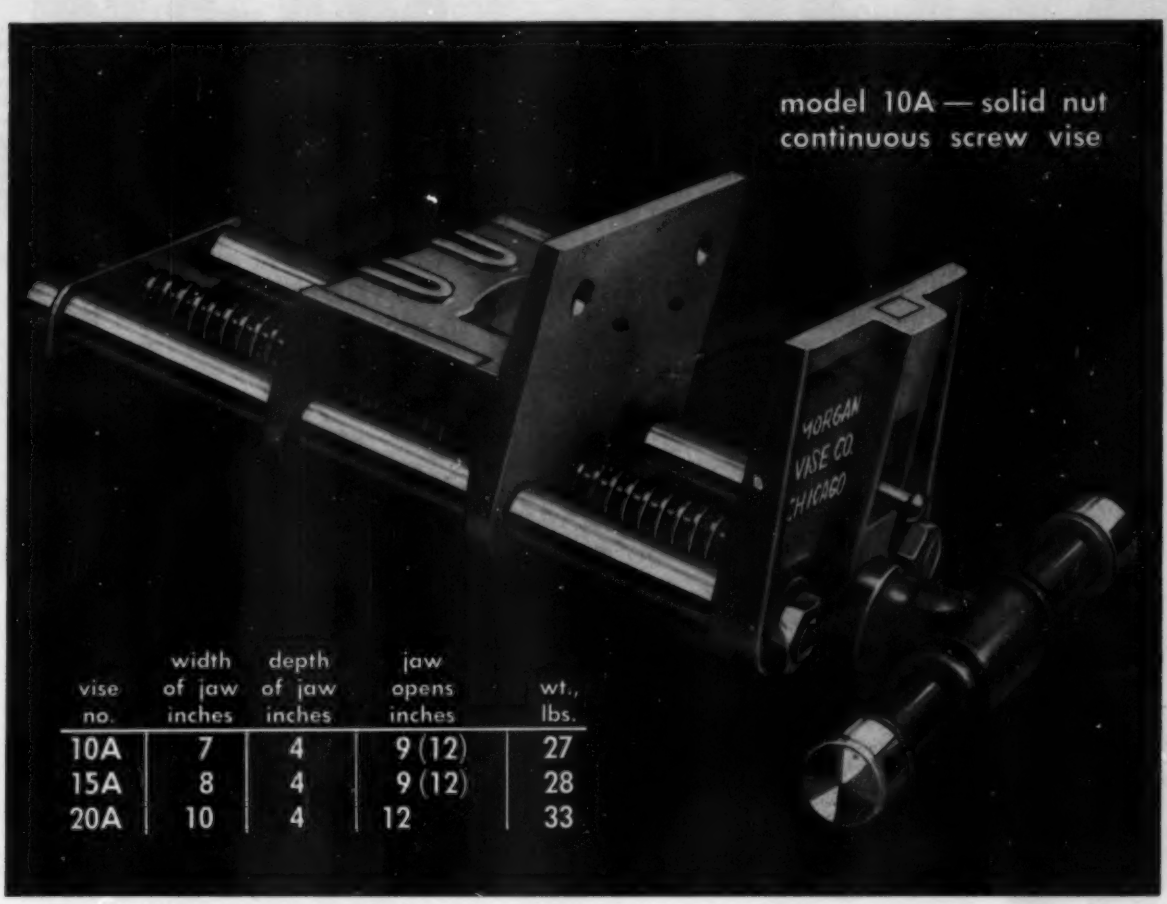
A citation for fostering vocational and arts education was presented to the Newark Evening News. Robert Palmer, staff correspondent, accepted the award for the newspaper.

A past-president's gavel paperweight and a life membership was presented to Joseph Kriesell, director, Camden County Vocational Schools, who served the association in 1957–58.

Saturday's sectional meetings consisted of programs in the graphic arts, fine arts, industrial arts, and home economics fields, and a meeting of the steering committee for the Second Annual Craftsman's Fair for Students.

George M. Morgenroth, director, Essex County Vocational and Technical Schools, was chairman, and the committee completing plans for the fair included: William Devonald,

(Continued on page 8A)



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ASSOCIATION NEWS

(Continued from page 6A)

Editor, NJVAEA Newsmagazine; John Smith, state supervisor of industrial arts; Arthur Wrigley, state supervisor of trades and industry; Richard Harthmann, Leonard Skolnick, Bud Williams, and George Trainer.

Co-operating with the Annual Ford IAA Program and sponsored jointly by the NJVAEA and the Public Service Electric and Gas Company, the exhibition of students' work will be held in the Public Service Auditorium, Newark, N. J., on May 11 to 15, 1959.

The climax of the convention was reached after visitations to the educational and commercial exhibits by members and the convening of the annual business meeting and all-convention luncheon.

All reports of the sectional meetings and the resulting election of the proposed officers was conducted at the meeting.

The tentative date for the 1960 convention at Asbury Park was listed for March 17 to 19. Philip Haney, assistant director, Essex County Vocational and Technical Schools, presented the president's gavel to Mrs. Heal of Moorestown at the conclusion of business.

The distribution of "The Ship's" plunder was conducted by Eugene A. Fink, deck officer, Delmar Publishers, Inc., and the Ship's crew. — *Charles F. Green, Publicity.*

CALIFORNIA TEACHERS ASSOCIATION

Teachers interested in examining European educational facilities and philosophies firsthand, and who also desire to explore some of the fascinating centers of the Old World may be interested in California Teachers Association's (Central Coast Section) seminar in Comparative Education for Summer, 1959.

Scheduled for England, Holland, France, Germany, Austria, Russia, Spain, Italy, the seminar offers five academic credits (graduate or undergraduate) through California Western University, San Diego, Calif. Cost of the 50-day trip is $995. Departs from New York on June 14, 1959.

TEACHERS MEET AT LOS ANGELES

The industrial education teachers of Los Angeles County met with the Los Angeles County Industrial Education Association at Downey High School, on Friday, February 20, 1959.

Dr. Arnold Schjeide, head of the Department of Nuclear Medicine and Radiation Biology, U.C.L.A. Medical Center, was the main speaker of the evening. He pointed up the advances in medical science which have had growing uses recently. These developments have expanded the potential of the use of radioactive materials in medicine and industry, but they have also brought increased hazards in their use.

Over 250 educators participated in the meeting, third in the series of four presented by the association during the year.

The meeting began informally with "Open House" in the shop classrooms of Downey High School. Industrial arts course offerings in the Downey High Schools include drafting, electronics, metal, wood, and graphic arts. At the junior high level handicrafts joins with wood, metal, and drafting.

Industrial education teachers look forward to these visitations to gain new ideas in classroom arrangement, student projects, and classroom equipment.

Later the educators met for dinner in the school cafeteria. The formal meeting was held after dinner, and a regular feature of Los Angeles County Industrial Education Association meetings, the "Quickie" preceded the main speaker.

To these educators, a "Quickie" means a five-minute demonstration by a colleague on some technique, project idea, or "trick-of-the trade."

Acting as hosts for the meeting were Clifford Shambaugh, superintendent of the Downey Union High School District; Leonard Schiefelbine, supervisor of industrial arts for the district; K. O. Esping, principal of Downey High School; and L. C. Turney, chairman, industrial arts department at Downey High School.

Teachers of Los Angeles County assisted in the work of the nominating committee by suggesting names of potential candidates for the offices of the county association.

ANNUAL SPRING INDUSTRIAL ARTS CONVENTION

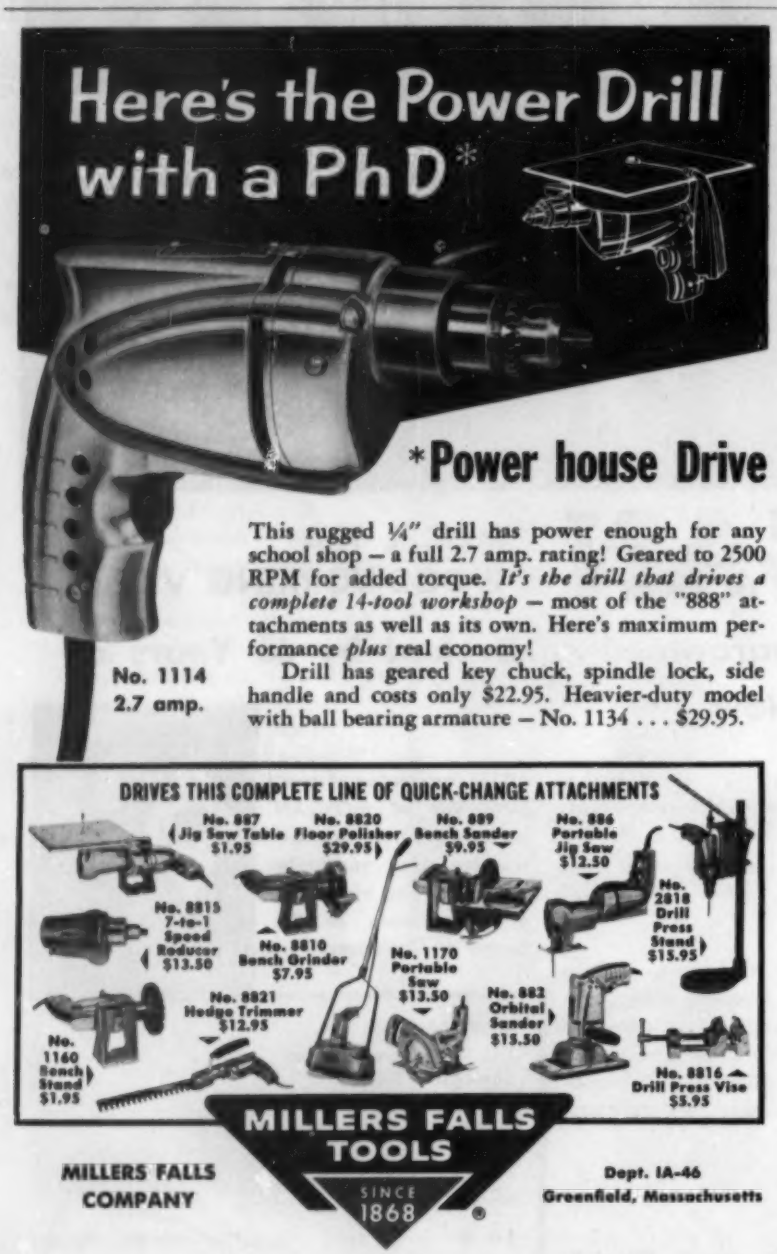
The 10th Annual Spring Industrial Arts Convention of industrial arts teachers was held at Bountiful High School, Bountiful, Utah, on April 18, 1959.

The program featured an outstanding educator, discussion seminars, a state-wide student project contest, a teacher project idea competition, and demonstrations.

Dr. Marshall L. Schmitt, specialist for industrial arts, U. S. Office of Education, was the main speaker at the opening session. His address was "Contribution of Industrial Arts to Mathematics and Science."

Association officers are: president — Wendell J. Petersen, West Jordan Jr. High School; vice-president — Russell Stephenson, Bingham High School; secretary-treasurer — Clement R. Nickle, Mt. Jordan Jr. High School, Sandy; and adviser — L. W. Glismann, State Department of Public Instruction, Salt Lake City.

(Continued on page 10A)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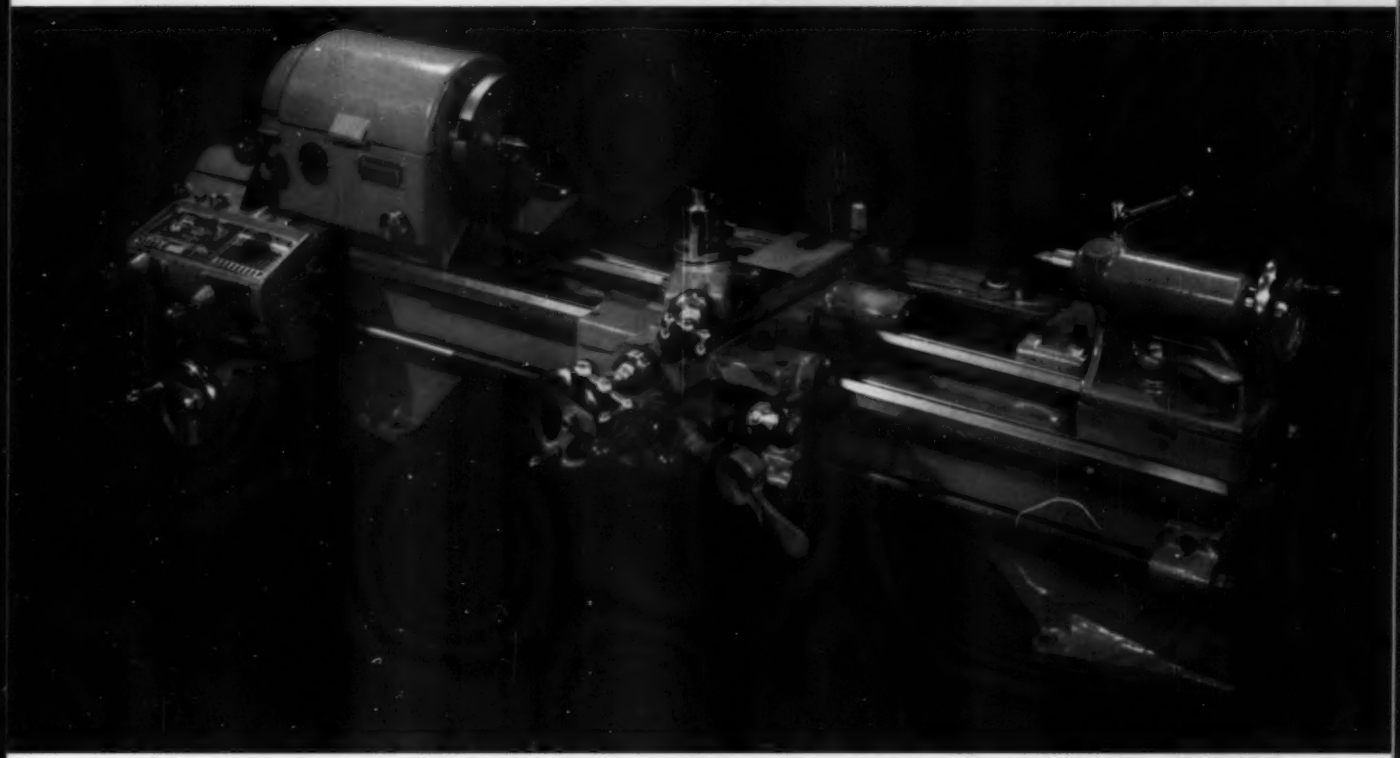

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ASSOCIATION NEWS

(Continued from page 8A)

MU SIGMA PI ANNUAL INDUSTRIAL MEETING

Mu Sigma Pi sponsored their annual industrial meeting with a visit to the Atomic Energy Power Plant of the Detroit Edison Company on Thursday, February 26, 1959. Dinner was served to 50, courtesy of the Detroit Edison Company.

CONNECTICUT INDUSTRIAL ARTS ASSOCIATION

The Connecticut Industrial Arts Association will hold its 26th Annual Spring Conference at the Teachers College of Connecticut, New Britain, on May 1 and 2, 1959.

The theme of the meeting is "Industrial Arts in the Scientific Age."

High lights of the conference will be the annual Student Project Fair and the Friday night banquet at which Dr. James Strickland of the Physical Science Study Committee, Massachusetts Institute of Technology, will be the speaker. His address will be "Science and the Industrial Arts."

On Saturday the conference will conclude with a luncheon at the college.

Ralph E. Keirstead, Consultant in Science, Connecticut State Department of Education, will speak on "A Pattern for Science Education in Connecticut."

NEW OFFICERS NAMED

Arthur G. Sticklor, head of the industrial arts department, Natick High School, Natick, Mass., was elected president of the Massachusetts Industrial Education Society at the annual meeting and banquet at the Continental Hotel, Cambridge, held recently.

Other officers elected were: vice-president — Aimo Teittinen of Weston; Secretary — William Howat of Hamilton; and treasurer — Robert Irving of Newton.

BLACK WALNUT

(Continued from page 16B)

threshold walnut log felt the footsteps of the Biddinger family, the neighbors — my father-in-law included — as they came and went. And it felt, too, the hurried tread and the weary tread, of the women folk as they crossed it on their way to the spring for water. Yes, there was no well that produced water, even in 1932, for the cabin stood on a bluff of solid limestone. To dig a good well to the necessary depth was indeed a major undertaking. So, each day, these three generations of womenfolk had stepped upon this piece of walnut, crossed the road, climbed a split rail fence and carried water from the spring on the hillside, one quarter mile away. Also, all during this 100 years my piece of walnut watched the hens lay their eggs and the chicks hatch, in the outdoor nests made of slabs of limestone. The old walnut threshold and the limestone nests were both still in use when I last saw the cabin in 1941.

Today, as I look at this piece of historic walnut with its adze marks, made over 100 years ago, I shut my eyes and turn back the pages of history to the middle 1700's when this once magnificent walnut was in its vigorous youth, loaded with ripening nuts. I see the big red fox squirrels frisking among its outstretched limbs, chasing one another playfully, as they gather in their winter harvest; and as twilight comes on, the wild turkeys coming to roost on their favorite limb. As the dawn approaches a cautious deer pauses under its shade, unaware of the danger from the silent Delaware Indian with his bow and arrow poised with deadly aim. Or later still, as white man encroached upon the Miami and Delaware Indian villages along the banks of Sand Creek, I can see him as hunter and hunted, taking refuge behind its protecting trunk. And finally, having lived through more than 100 years of eventful times in Indiana history, I see Grandpa Biddinger in the spring of 1832 approach with keen-edged ax and lay low this forest monarch. If he could but return today, 114 years later, he would find his hand-hewn walnut threshold log still as good as the day he cut it.

Even the botanical name of walnut reveals character, history, and romance, for *Juglans* refers to Jupiter, King of the Heavens. Literally translated, *Juglans* means Jupiter's glands, or Jupiter's nuts, and the Ancients thought eating of walnut nuts promoted the powers of love. However doubtful that quality may be, our prehistoric American Mound Builders, the mystery race of the Ohio and Wabash Valleys, knew the true character of Black Walnut. They had used it long before the coming of white man.

In all there are some 50 different kinds of walnut in the world, the best known being our own black walnut (Juglans nigra), butternut or white walnut (Juglans cinerea), and English walnut (Juglans regia). The range of all walnuts includes parts of South America, Central America, Mexico, the West Indies, Europe, Manchuria, China, Japan, India, Persia, and the United States. The range of my black walnut (Juglans nigra) from the Grandpa Biddinger threshold log, is in the rich bottom lands and fertile hillsides from Massachusetts west to Minnesota, south to northern Florida and Texas. At its best this tree grows from 100 to 150 feet high and from 4 to 6 feet in diameter.

The present-day qualities of black walnut have been known since the early pioneers used it for the now antique colonial furniture. My own father used

(Continued on page 14A)

You get a faster job with these new Black & Decker woodworking tools!

FASTEST CUTTING Finishing Sander on the market; No. 88. H.D. Sander leaves no swirl marks—sand with, against, across the grain.

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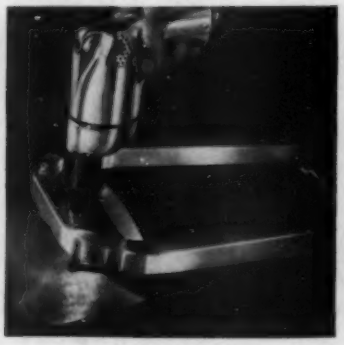

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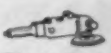
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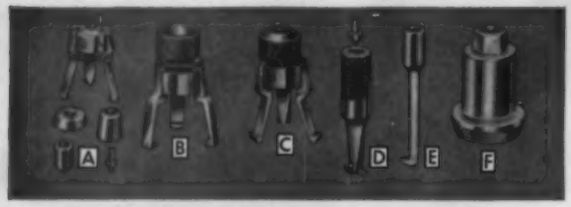

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BLACK WALNUT

(Continued from page 10A)

it for rails in his snake fences, while I personally made many a crude baseball bat from those same walnut rails. My brother has a nearly priceless walnut gate-leg table, hand made, with leaves 20½ inches wide, each made from one board — perfect material. I had a pre-war opportunity to buy the hand-hewn boards from a 100-year-old Wabash Canal tavern counter at Pittsburgh, Ind. Solid, perfect boards 24 to 32 in. wide, over 12 ft. long, for a mere pittance! How I regret my error now, for today I gloat over getting even a 12-inch board, with sap as no defect.

Personal News

WAYNE S. RAMP

Wayne S. Ramp, who served on the Bradley University ICA Contract Team during 1956–57 in Baghdad, Iraq, is currently the trade and industrial teacher trainer at Southern Illinois University, Carbondale, Ill. He teaches some of the graduate courses in industrial education.

Mr. Ramp received his Ed.D. degree from Bradley University in June, 1956.

Prior to his two years in Baghdad, Mr. Ramp had spent nine years as vocational machine shop instructor at the Streator Township High School, Streator, Ill., and also chairman of the industrial-arts department.

THOMAS G. KING COMPLETES DOCTORAL WORK

Thomas G. King, teacher in the Detroit Public Schools, and member of the part-time staff of the Department of Industrial Education, Wayne State University, Detroit, Mich., received the Ed.D. degree at the University'z Commencement on January 29, 1959. His dissertation entitled "Fundamental Procedures of Research for Industrial Education," culminated in manuscript for a syllabus in research procedures to direct graduate industrial education students as they prepare their research and reports.

A native of Wisconsin, Dr. King received most of his early schooling in Springfield, Mass., where he graduated from the Technical High School in 1939. After entering Stout State College in Menomonie, Wis., his education was interrupted for three years by service with the U. S. Army in Panama and Europe. His two previous college degrees were both conferred at Stout State College in 1946 and 1947.

He is a member of Epsilon Pi Tau, Alpha Psi Omega, Mu Sigma Pi, and Phi Delta Kappa fraternities; a life member of the Stout Alumni Association; National Education Association; Michigan Industrial Education Society; and a member of its board of directors; Detroit Teachers Federation; Michigan Schoolmasters' Association; American Industrial Arts Association; and the American Council on Industrial Teacher Education. In 1956 he was appointed to serve on the advisory board for the John H. Trybom Memorial Library Collection at Wayne State University.

Dr. King has taught in both elementary and secondary schools in Detroit and is presently a woodworking teacher at Redford High School. In addition, he has served, since 1952, as a member of the part-time faculty of the industrial education division at Wayne State University where he teaches both technical and professional courses at both the undergraduate and graduate levels. In 1954 he taught an extension class of Canadian teachers at London, Ontario.

TOP SENIORS HONORED AT WAYNE

Two outstanding members of Wayne State University's January graduating class received the annual David D. Henry Awards for Leadership and Scholarship at recent "Swing-In" ceremonies for seniors.

Award winners, selected by the senior class board, were presented medals by University President Clarence B. Hilberry. Those honored were: Faye N. Arnold, of 14559 Robson, who majored in library science, and John R. Eriksson of 16897 Riverview, a philosophy major.

Mr. Eriksson and Miss Arnold received their degrees along with 1289 graduating seniors during ceremonies at 8:30 p.m., on Thursday, January 29, 1959. Miss Arnold received a B.S. degree from the College of Education. Her activities and honors include: chairman, Association of Women Students' Big Sister Council; recording secretary, Mortar Board; treasurer and president, Kappa Delta.

Mr. Eriksson received a B.A. degree from the College of Liberal Arts. He has been student engineer at WDET-FM; Arab Fraternity social chairman; Key Club chairman; and a

(Continued on page 17A)

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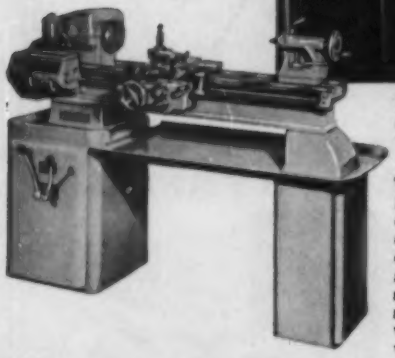

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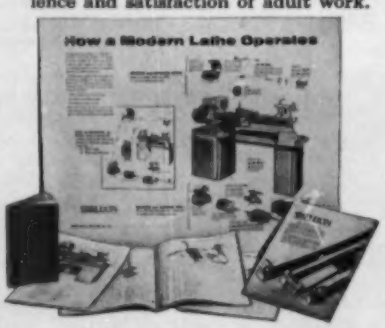

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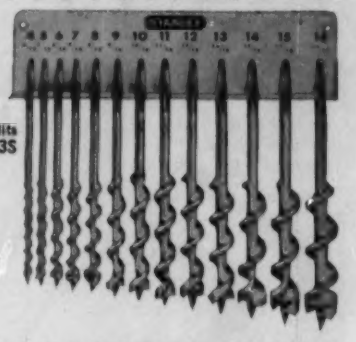

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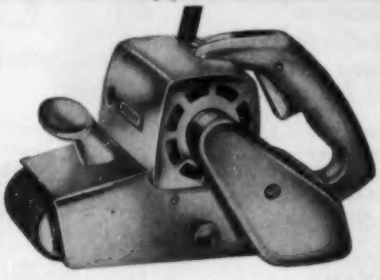

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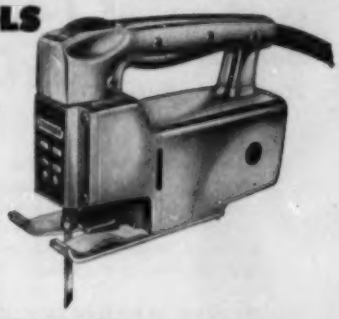

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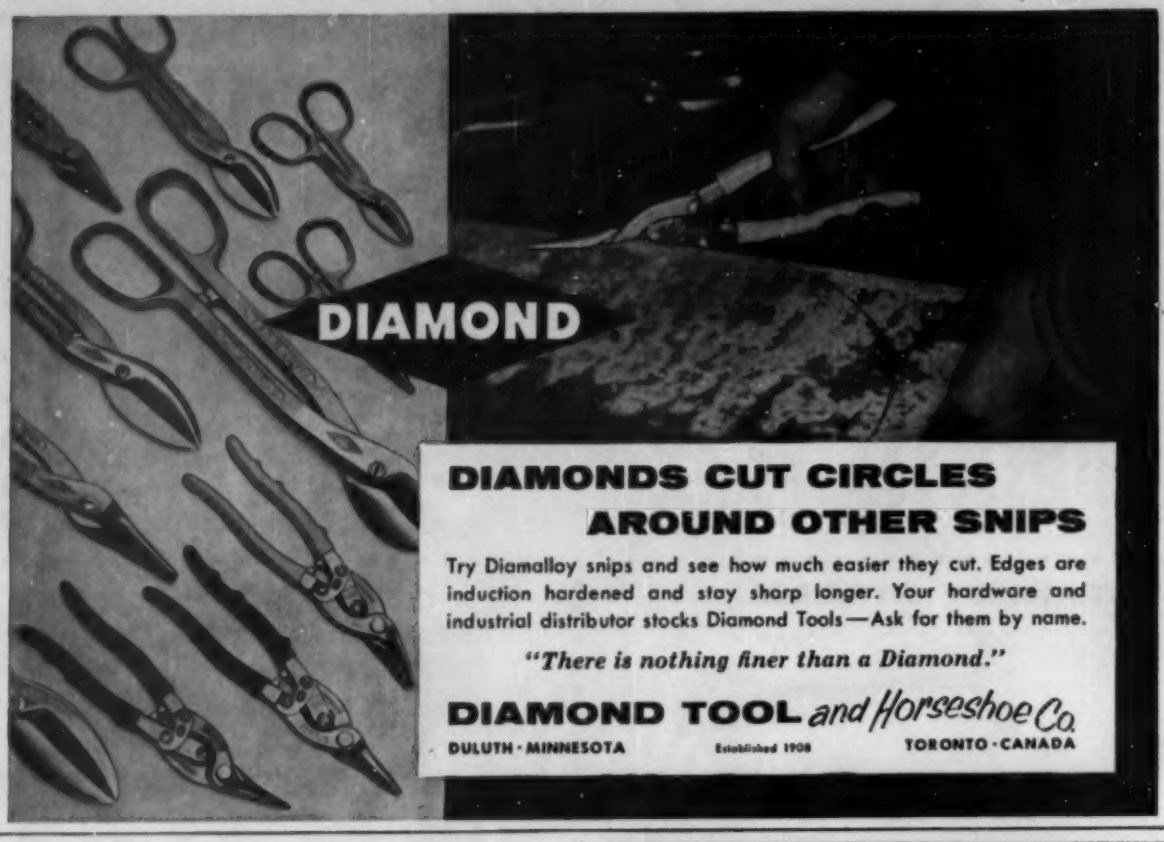
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PERSONAL NEWS

(Continued from page 14A)

member of the Student-Faculty Council charter committee.

The David D. Henry Award was established by the Class of 1948 in honor of the University's former president. Dr. Henry is now president of the University of Illinois.

WSU PROFESSOR ELECTED

Charles E. Wales, assistant professor of chemical engineering at Wayne State University, was elected grand marshal at the national convention of Theta Tau, national engineering fraternity, at Madison, Wis., recently.

♦ Alva Jared has resumed his position on the staff of the Industrial Arts Division, Wisconsin State College, Platteville, Wis. He served two years in the Army. He is teaching auto mechanics and industrial-arts crafts.

♦ William Buttery, who served as a faculty assistant, is now a full time member of the Industrial Arts Division staff at Wisconsin State College, Platteville, Wis. His specialties are plastics, architectural drawing, and woodwork. He is continuing his graduate work at the University of Minnesota.

♦ The following are appointed to membership on an International Development Commission of Epsilon Pi Tau, Inc., concerned with "Industrial Arts Merit Awards for High School Youth":

Professor George Mehallis, University of Miami, Coral Gables, chairman; Dr. Joseph W. Duffy, State Teachers College, Montclair, N. J.; Marshall Hurst, Dade County Board of Education, Miami; and Jack E. Reynolds, Unified School District, Sacramento, Calif.

News Notes

INDUSTRIAL TECHNOLOGY AT STOUT STATE COLLEGE

Indicating industrial areas of Wisconsin in which industrial corporations are showing interest in members of the first graduating class of industrial technology graduates of Stout State College, Menomonie, is Frank J. Belisle, placement chairman of the college.

Two seniors of the industrial technology class, William McKinnon (left), Neenah, and J. Aubrey Olson, Eau Claire, pay close attention as Mr. Belisle describes opportunities available in this new type of Stout graduate.

HENRY FORD MUSEUM, GREENFIELD VILLAGE

A revision of policy for visiting school-age groups to Henry Ford Museum and Greenfield Village has been announced by Dr. Donald A. Shelley, executive director.

Effective April 1, 1959, advance reservations will be required to qualify for reduced educational admission rates, which will be standardized at 25 cents at both the museum and village, regardless of a child's age or grade level.

The new policy annually will effect more than 3000 visiting educational groups.

The new ruling applies to organized classroom groups from kindergarten through college when accompanied by an accredited teacher, and to community sponsored groups under the supervision of an adult leader.

Accredited teachers will continue to be admitted at no charge.

Additional information and special handbooks for teachers are available from the *Guest Relations Department, Office of Education, Henry Ford Museum and Greenfield Village, Dearborn, Mich.*

THE NAVA MEMBERSHIP LIST AND TRADE DIRECTORY

Arrangements for the rental or purchase of audio-visual equipment, projection service, rental of 16mm. films, the tape recording of meetings, the repair of audio-visual equipment, and for all types of audio-visual presentations, can now be made throughout the United States and Canada through the use of a new Membership List and Trade Directory just pub-

(Continued on page 38A)

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Shear cutting fence gives you precision cuts even when grain is poor or knotty. Fence can be adjusted to permit movement of stock at 10° angle across cutterhead, reducing impact at point of cut and resulting in smoother finish. Set of 2 jack screws at each knife for individual adjustment. When rabbeting, guard encloses knife head at rear for complete student safety. Choice of six enclosed motors, two starters. Also in 6" model.

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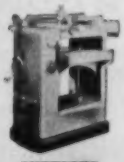
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This rugged bench model has cast base, heavier guide bars and guide bar support arms with adjustable bronze gibs. Features include 45° swivel vise, pressure relief on back stroke, length gauge bar, Oilite bearings throughout. See your dealer or write for Bulletin No. 257.

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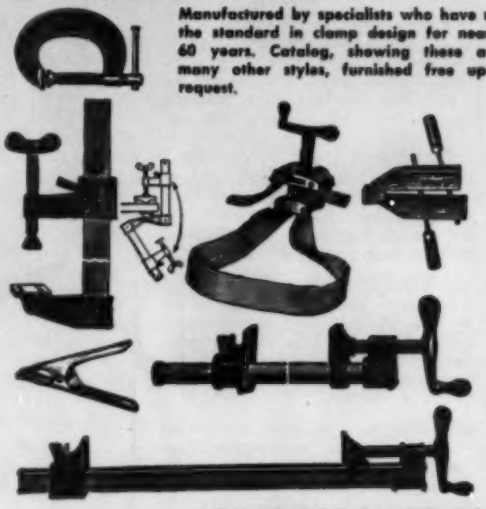

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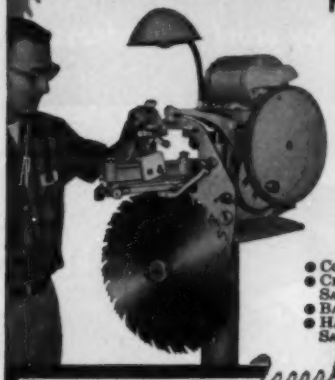

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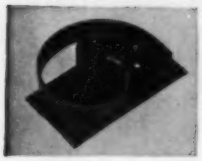

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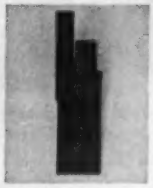

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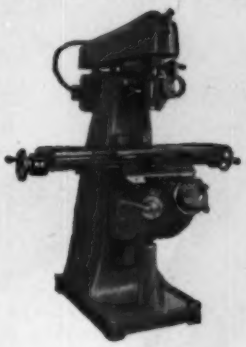

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
MAY 1959

Our Automated Industrial Revolution—Part IV

THOMAS A. HIPPAKA
Iowa State College
Ames, Iowa

Labor-Industry Relationships

We need to recognize that automation, with all of its complex phases, will continue to provide grounds for controversy between labor and industry. When management is compelled to resort to redundant dismissals, a serious aftermath is in the making. Such was the situation in England in 1956 when the first major automation strike occurred. People do not become alarmed when accelerated automation takes place in the face of increased demands for goods which generally stimulates increased employment.

While automation has eliminated many of the conventional problems in industry, it will always create new ones. Industry and labor will continue to have their differences. Peaceful and judicious settlement of these problems must be their chief concern. The importance of fair-minded deliberations between these two groups will loom large, for they will need to work at the all important business of mutual confidence and trust, if they are to resolve their differences.

Democracy is a partnership between the government, industry, labor, the farmer, and the consumer. It could be rightfully said that the personnel and their families in the latter four groups, which include all of the country's population, constitute the government. Whenever any one of these groups works only for the enhancement of its own welfare, and forgets the nation's general well-being, our country pays a price. Generally speaking, the average American consumer is slow to anger. On the other hand, when his ire is sufficiently aroused, he makes his private opinion known, and with this all-powerful weapon he registers his complaints against any group action, or their contemplated proposals. For any group or individual to invite the wrath of public opinion in a democracy is to commit some kind of suicide.

Automation Increases Citizenship

Automation is bound to increase our citizenship responsibilities, as employees or employers. This will always be the price we pay for the many blessings which it brings to us. As it enriches our lives it must not be allowed to lead to redundancies which can create unwarranted problems. As automation affords people more leisure, their moral responsibilities must be upgraded accordingly. They must do their utmost to understand the world, their own government and its problems, as well as the problems of labor, industry, and agriculture. As consumers and citizens they must be willing to make their sound personal opinion public opinion in order that the whole country with its many segments of endeavor can profit thereby.

Basically, our government is "of the people, by the people, and for the people." This sound concept of government was expressed by Abraham Lincoln during the nineteenth century. It manifests the dignity of man, as well as his three-sided responsibility as a free citizen in a democracy. A nation of free men unwilling to assume this unique responsibility will soon lose their freedom, as well as their democracy.

Woodrow Wilson bequeathed us the unique axiom that "the best government is the least government." This state of affairs can only come to fruition when citizens do voluntarily what they ought to do. Whenever this condition prevails, law enforcement by governmental agencies is cut to a minimum. Where labor and industry can settle their differences through tolerance, ingenuity, and common understanding, governmental refereeing and interference will be cut to a minimum.

It is to be conceded that labor unions will continue to promote the general welfare of the workers. They intend to see to it that workers are regarded as human beings and not mere appendages to machines; that they do not become the slaves of industry; and that automation is never employed in the exploitation of anyone. These are the worthy goals of the labor organizations. In the

process of assisting workers to retain their rightful place in the scheme of things, labor unions need to remember that what is good for a democracy as a whole is good for the individual as a citizen in it.

It is one thing to design and to control our machines, but it is quite another matter to weld human nature into efficient units of production. The unpredictability of man's reactions will always constitute a problem. If men cannot be led into settling their differences amicably, production with the best of automatic equipment will ultimately suffer. The worker, himself, will become the victim of diminishing returns. Reason dictates that the employee is justified in demanding his rightful share of any increased prosperity brought about by automation, but when he goes beyond that point he may be "killing the goose that laid the golden egg."

Unions can be made great humanitarian institutions if their leaders and followers so desire. Automation will bring continuous innovations, and labor must realize that change is inevitable. Old ideas, devices, and methods must give way to the new. Labor must be willing to face up to these innovations with courage, patience, understanding, reason, and adaptability; in order that America may derive the greatest possible benefits from our industrial civilization. "An ounce of prevention is worth more than a pound of cure." Timely conferences between labor and industry, when a consequential change is still in its embryo stage, will avert many a serious conflict. This process must always remain a two-way street regardless of who makes the original proposal. Innovations, regardless of where they originate, must ultimately be sold to all concerned; so this job might as well be initiated at the time that the change is originally proposed. The changes may have to do with such matters as contemplated economies, shorter working hours, better utilization of machines or labor, improved process control, and pay increases. In any event, be it labor or management, understandings bring the best results.

Unwise wage differentiation during transitional periods involving greater plant automation can very well accentuate labor-industry difficulties. Workers operating complicated, automatic devices will be paid more than those who work with conventional equipment. The latter may be just as ambitious to forge ahead as their fellow workers on automatic machines, but for him the opportunity is naturally slower in presenting itself. The solution of these difficulties will depend largely upon the speed and the extent to which automation forges ahead.

Automation Should Not Create Panic

While the potentialities of automation are beyond ordinary comprehension, they should not create panic. Nor should we develop undue frustration, for we have coped with the problems of industrial evolution and revolution before. Realism on our part compels us to realize that progress presents problems, but study brings understanding, which leads to ultimate solution. If we take the attitude that industrial progress ultimately benefits all of our people, we will be better able to suffer certain, inescapable inconveniences to attain our goals. When it is necessary for a worker to migrate to another community, the change has its many complications. Nationalization of production is not a panacea for our ills, and still, the government should always be concerned about the problems peculiar to accelerated automation.

Problems arising in the automatic process have actually kept industry in balance. There have been very few violent crises resulting from automation. When we realize that automation will be limited to industries which employ not over twenty-five per cent of our labor supply, we need not become unduly alarmed. Typical industries not adaptable to automation are those which render a personal service of a specialized character, as well as those that manufacture nonstandardized goods. Industry will have difficulty keeping pace with scientific development more especially, pure research.

The Responsibility of Labor and Industry

Both labor and industry owe a deep and abiding sense of responsibility to human beings. The accumulating of funds, essential as they are, cannot become the sole, dominating function of these groups. The importance of deserving, human beings should never be minimized, especially in an automatized industrial civilization, where workers will continue to be all-important.

Opportunities for employment should be stressed far more than guaranteed employment. Of course, employment opportunities should be everyone's concern, and a worker deserves employment when he is willing to prepare himself for it and to carry out the duties which the job demands of him. Instances will arise when there is a redundant labor force in one department of an industry, and a worker should be willing to subject himself to preparation for a job in another department if that seems necessary. He may even have to transfer to another industry in the same community.

The productive capacity of the United States literally knows no bounds. In the year 1958, with one sixth of the world's population, the United States was producing more than 50 per cent of the world's goods. In speed, quality, and quantity of production, no nation has the power to surpass her. Automation is constantly increasing this superhuman effort of a people whose imagination, inventiveness, and industry have astounded the rest of the world.

As the productive efficiency of America has forged ahead, there has been a significant change in the structure of industry. Bigness characterizes industrial organization today. The larger and more wealthy concerns have absorbed many of the smaller enterprises, as more power has been centered into fewer hands. This centralization of power, with automation constantly accelerating production, makes the bigness of industry frightening to many. Such fears can only be alleviated where labor as well as industry, both characterized by power, assure the people of America that they put their country's welfare first.

The importance of an adequate educational system looms large when we realize that in a world like ours, only the productive can be strong, and only the strong can remain free. Our superiority in the field of industrial production will depend very largely upon the kind of educational system we are willing to finance. A country with a second-rate educational system can only have a second-place industrial economy.

As the process of automation increases in complexity, the importance of a good technical education assumes even greater significance. Complicated devices conceived by the scientist and the designing engineer will always have to be built. Naturally, a high premium will be placed upon the kind of craftsmanship which is accompanied by a good background of mathematics and science, as well as a thorough knowledge of the nature of materials and the newer tool and machine processes. There was a time when we held to the theory that to make a craftsman out of a man was sufficient. Now we know all too well that he must not only be a craftsman, but he must be a citizen as well.

The complexity of automation, with all of its various components, demands that worker preparation in all of its categories must reach a higher plane. The traditional concept known as training of workers will no longer suffice, for it connotes narrowness. To the mastery of fundamentals must be added broader understandings, adaptability, and powers of application.

As automation becomes even more complicated, a greater number of workers will have to be educated in every sense of the word. They will need to be

good citizens of character and moral righteousness whether they are scientists, engineers, managers, machine supervisors, mechanics, or repair men. Industriousness, punctuality, versatility, willingness to learn, ability to get along with people, the ability to apply fundamental principles, proper attitudes in a variety of situations, mastery of communications skills, imagination, common sense, and good judgment — all will be most essential in a world of automation. The willingness to acquire new skills will become a long-time imperative for those who intend to remain in the ranks of the employed. It will no longer be general academic education for one worker, and technical preparation for another; it will be a proper balance of the two for the mechanic as well as for those who manage an industry. Men will have to be educated as scientists who do the basic research; engineers will plan and build the plants with the aid of skilled craftsmen; supervisors will understand the automated factory's complexities, synchronizing its various operative components into a productive whole; while certain experts will constantly maintain the automatic devices in good working condition. The complexity of the whole process of automation will continue to make it even more imperative for all workers to increase their fund of knowledge as well as to improve their various skills. It could very well be said that there will be times when the worker's persistence to learn will be more important than much of what he has already mastered in the way of knowledge, skills, and application.

Automation does not have to lead to undue uniformity in products. We can have variety in production by convincing the consumer to pay a little more for variation in the design of needed products.

Even though the potential market is not saturated, certain conditions can materialize whereby we can have such a situation. America witnessed overproduction in agriculture after World War II. The necessity adjustments from wartime production to peacetime production did not take place early enough. It became the number one problem for the agriculturist as well as the consumer, who are both taxpayers. Where people have the need and the purchasing power, such a condition need not arise in connection with industrial products. And the working class is the key group in this situation.

Labor unions will have to examine anew their existing structures. The causes of certain old disputes may disappear, while new ones, no doubt, will always be in the making. Certain crafts can very well become integrated, thereby destroying the older lines of demarcation between them. New jobs will be in the making, and the conventional ones will disappear. Labor will have to develop a new perspective as it faces new job specifications that are different from the old. It will not only view its own problems in a new light, but it will have to see management's problems as well, if there is to be concerted action for the good of the whole country.

The Cost of Automatic Equipment Demands Constant Utilization

Due to the tremendous cost of automatic equipment, corporations cannot afford to let it stand idle as long as the more conventional equipment did. Fuller utilization of automatic devices may leave workers with awkward working hours. Changing the pattern of living as the night shift does, for example, can inflict a hardship on the rest of the family, as well as on the breadwinner. Workers have and will accept shiftwork from sheer economic necessity, and while they accustom themselves to it as best they can, they do not like it. Compensatory remuneration may be necessary if fuller use is to be made of our automatic equipment on a shiftwork basis.

Automation is creating new job titles which, in turn, are being introduced into our industrial vocabulary. The problem of grading workers will become more acute as automation progresses. New skills are being demanded of new types of industrial workers, all of which constitute a healthy antidote for the much feared unemployment epidemic.

The More Complicated the Machine, the Higher the Wage

Categorizing workers on the basis of unskilled, semiskilled, and skilled has become outmoded. Labor and management will have to co-operate in formulating a set of principles upon which the grading of occupations can be based, in order that their value can be accurately assessed. Whenever wage levels are assessed in automated industries, the responsibility demanded of the worker will require full consideration. It naturally follows that workers who control the more complicated machines should be paid more than the employees who operate the simpler machines. The whole wage structure will have to be revised. The ratio of common laborers to the total number of people employed will grow less and less.

In the conventional factory, people have been paid according to their productive effort. Automation changes this procedure because the rate of production is now determined largely by automatic machines. The conventional method will not suffice in determining wages, or even the grading of a man's work. Breakdowns in automatic machines performing a multiplicity of operations can be so serious that waiting-time payments can become unduly complicated.

Boredom has been prevalent in American industry for decades. The concept has been abroad for sometime that the more intelligent a worker is the more bored he will be on a typical production line job. There may be a good deal to the theory that a reasonably retarded person is the happier person on such a task. It is conceivable that certain people enjoy a simple, repetitive job because of the absence of any great responsibility on their part, and because of the ease with which they can perform the task. On the other hand, there are people who suffer through the boredom of each day's work because the wages are good. Automation obviously will not eliminate the possibilities of boredom even though it will take more brains to supervise the functioning of automatic machines. The pride which we are able to take in any job will help in meeting the problem of boredom. If we are really sold on the product which we are helping to produce, that too will alleviate boredom. Then, there is the support of someone we love, the welfare of our community, the preservation of our democracy, the thoughts of which spur us on, and boredom is not quite so acute.

As long as we have automation, there will be workers who will have to change their occupations. Wherever feasible, employees should get some timely warning of such changes or modifications that are contemplated in the automatized method. Naturally, the training opportunities provided by automatized plants will assume greater significance as automation becomes more complex. Any program of this character will have to be a fast moving one in a complex and constantly changing industrial economy. Company training programs will not only equip workers for a new occupation in the same factory, but the fact that such training is available, will be a good morale builder. Employees will know that they are appreciated as human beings, and that the company has a genuine interest in their future welfare.

Management Must Provide Needed Training

Management, too, has an important stake in its training program. The continuous investment in any such program can become a sizable amount from which the returns can be noteworthy. The appreciative employee will take every advantage of it, not only to remain on the payroll, but to serve his company and community to the best of his ability. Benefits of such a program to management can be measured in terms of good will, an indispensable commodity in any business venture. Management will be

selecting, training, and retaining people whom they already know to be a good risk, thereby assuring themselves of a staff of capable workers with the least amount of expense and inconvenience.

The employee must look at his job as something more than just a source of financial income. If this is all it means to him, he cannot be very happy as a wage earner in it. Legitimately enough, his first concern is his family and himself. On the other hand, he also gets job satisfaction to the extent that he feels he is bettering the lot of humanity in general. Without such job satisfactions, one's occupation can certainly become a piece of very distasteful business. An employee who is loyal to his employer; who is proud of his company and the product which it produces; who appreciates the fact that the factory in which he works constitutes the very lifeblood of his community; that man is a credit to himself, his family, his community, and his country.

Fear of turmoil in industry is not a one-way street. Both labor and industry have suffered the pangs of consternation for many years. Fear can be reduced to a minimum by mutual confidence gained through common understandings developed in conference rooms. Automation offers management, as well as labor, new ways in which to put pressures upon each other. Through automation the factory owners can exercise greater power of authority on the worker than ever before. Unions will not forego the right to strike, and by stopping one section of an automatic plant, the whole of the factory's production comes to a standstill. The more complex industry becomes, the more potent become the weapons for creating prolonged labor-industry upheavals. Each side should have the other's assurance that unfair practices will not be resorted to even when the acceptable settlement of a dispute seems utterly impossible. Not only do labor and industry pay a price, but the whole country suffers when they prolong their conflicts unduly. Automation, by its very nature, can intensify disputes unduly, unless labor and industry display some very progressive thinking and action seeking in the days ahead. Progressive thinking and democratic action, which often portend compromise, constitute the real answer. Legislation alone will not do it.

There is no denying the fact that unemployment has been a very real fear in the minds of free men as long as they have worked for wages. When a man loses his job his house may literally cave in. So important is a job to the average man that he quite readily connects its deterioration with certain management changes or even rumors of change. The spread of erroneous rumors can be prevented when the workers recieve timely and valid information from management. Workers will always take more kindly to a change when they are taken into management's confidence at the earliest possible moment whenever changes are being contemplated. By no stretch of the imagination can we say that automation need seriously jeopardize the future of the American worker. In the long run automation will add very substantially to his general welfare in the way of more jobs, better pay, shorter working hours, greater safety from accidents, fewer health hazards, and the elimination of back-breaking labor.

The Economic Outlook

Capital requirements have always entailed a sizable item of expenditure in industry. Constantly mounting costs of labor, building materials and equipment have seriously complicated and even impeded plant construction. On the other hand, automatic equipment in recent years has increased production to the point where such acceleration contributes very materially to capital outlay, thereby providing greater, and more readily available capital assets for plant automation.

Capital Outlay

Automation is generally a costly enterprise, as far as initial, capital outlay is concerned. When maximum automation is attempted in old buildings already equipped with outmoded machines, the capital investment will naturally depend upon the degree of their obsolescence. Obviously, buildings can become so dilapidated that their rehabilitation would prove a very poor investment. In such situations, common sense demands that it would be much more economical in the long run to construct a modern, well-equipped plant, thereby assuring maximum efficiency, when full production becomes a reality. Naturally, the problems which arise from plant and equipment obsolescence are totally eliminated when a company automates an industry housed in a new building with modern, automatic equipment.

Manufacturers, not burdened with plant obsolescence, possess certain advantages over those who are, when extensive automation is being contemplated. They can "automate to the hilt" in the very beginning, and although the initial investment is a sizable one, very substantial savings will accrue to the company over a reasonable period of years.

Generally, there are inescapable costs, which are peculiarly high, due to the very nature of automation. Automation aims at high precision, and precision equipment is generally expensive. The intensive use of equipment can mean frequent replacements. In a highly competitive civilization, obsolescence is reached rather rapidly, all of which means continuous replacements of expensive equipment. Improvements in machine tools are being made constantly, and when any industry's competitor installs the newer equipment, that industry must do likewise, in order to stay in business. Thus, automatic equipment may be abandoned before it actually wears out; to be replaced by more efficient machines, which may ultimately save even greater unit costs.

Automation and the Rate of Production

The primary justification for automation is that it increases the rate of production, thereby lowering the cost of goods to the consumer. Its purpose is not to leave men jobless in its wake, but to provide work for more people. When a greater number of our citizens can have more modern conveniences, the demand for the products of industry will increase, thereby providing more jobs for more workers.

What has been true of many other industrial advancements, will no doubt be true of automation, in the long run. Costs will ultimately decrease. There will be more cost-reducing inventions, as time goes on, curtailing the amount of working capital required per unit of output. In order to further reduce the essential working capital, the processes of production can be accelerated.

The volume of capital resources can be increased in a number of ways. In Russia the scheme is very simple. People are ordered to work harder on a lower standard of living. The country's productive capacity is then employed in the piling up of capital assets, which very largely explains the acceleration of automation in Russia. In the United States we cannot dictate to consumers as to what and how much they may have, even though Americans have been quite co-operative in this matter during our shooting wars. We cannot force men to work harder and longer for less wages, especially during times of peace. In America, men are free to do as they please, invest in a concern as they see fit, fight for more pay and shorter hours, and insist upon higher standards of living.

In the final analysis, the consumer pays for increased cost of production. Wage increases, cost of raw materials, capital outlay, work stoppages — all are passed on to the consumer. Conversely, when production costs are reduced, the consumer generally benefits thereby.

The financial benefits accruing to the company are naturally divided between the enterprise and the company's share-

holders. The division of profits naturally affects the flow of capital investments, and when the dividends are substantial, risk capital is naturally more plentiful.

Once a company has decided to automatize its plant, there is no turning back if it is to remain in business. The prospects of a recession can make this a very unpleasant venture. To stay in business, especially in the face of tough competition, capital outlay must be continually forthcoming in order to keep the plant as modern as possible. During times of full employment, ample raw materials, and brisk consumer buying, additional capital is naturally invested with greater confidence.

By its very nature, automation affords a number of distinct advantages, even in the matter of ultimate capital outlay. Since an automated plant requires less workers for its full operation, the factory, as well as its site can be less spacious, thereby creating a substantial saving in the initial investment. Machinery can be employed more intensively, thereby requiring less duplication of equipment. A newly automated industrial plant can be an extremely safe one, which naturally means that the safety program is going to cost less. The more desirable workers generally gravitate toward the newer and safer factories. This inducement generally proves to be a decided advantage for management, especially during times of high employment.

Administration

John Diebold would have us understand that automation could be termed an attitude of mind which makes the maximum use of man power, machines, and other resources in producing goods. It could very well be said that the administrators of any successfully automated industry provide the attitude of mind essential to the implementation of Diebold's definition of automation.

Hugh Jones speaks of automation as:

> ". . . an acceleration of a process which has been going on a long time, ever since the first water-power and steam-power machines were introduced. . . . What has happened recently, however, is that the science of electronics has suddenly enabled industry to do things in connection with mechanization that were not possible before."

The science of electronics has not only invaded the realm of actual production in the factory, but it has come to the aid of the administrator in his all-important sphere of activities.

Mechanization in industry's administrative offices before electronics entered the scene was made possible by such equipment as electric calculating machines, franking apparatus, form folding machines, letter opening devices, the teleprinter, dictation machines, cash registers, accounting machines, and punch card machines.

Administration in automation naturally entails the direction and the control of the business. As automation has eliminated clerical workers more rapidly than any other workers in industry, administrators have acquired office equipment of unbelievable versatility with which to expedite their important duties.

The administrative personnel assumes the over-all responsibility for the industry's successful operation. This group must formulate, as well as execute, the long-term as well as the short-run plans for the entire industry. The board of directors selects capable executives with strong leadership qualities who carry out the policies of the company.

It is the duty of the administrative staff to purchase all of the raw materials, supplies, and equipment needed in the industry. Requests for such items naturally come from the department heads. Intelligent purchasing means timely buying, and contracts are naturally awarded to the best and the lowest competitive bidders.

Administrative Staff and Its Customer Relationships

The administrative staff has a very far-reaching relationship with the company's customers, the present, as well as the prospective ones. They forward quotations and invoices to consumers. The administrative offices receive all orders and put them into such form that the factory and dispatch departments can process them. Records must be kept of the total goods invoiced to the buyers, the payments received, and the balances due from all customers. Proper and timely action must be taken when buyers do not meet their obligations to the company.

While it is the duty of the personnel department to supervise the hiring and dismissal of workers, the administrative staff maintains the payroll records of all employees. This staff computes the pay due employees, the tax deductions, pensions and social security outlays prior to the payment of all wages and salaries.

Industrial administrators and research workers are closely associated with each other in their respective responsibilities and efforts. They keep each other informed regarding the company's needs, potentials, and accomplishments.

The wise administrator realizes that research is the very lifeblood of any industry. This all-important activity, without which an industry cannot survive, demands special buildings, equipment, and scientists who make research their lifework.

Administrators not only seek the aid of the company's researchers, but they work in close co-operation with the firm's engineers and designers. Old products need to be redesigned or discontinued, while new products with greater commercial and productive suitability need to be created. As a company improves its own products it endeavors to predict the salability of its competitor's products, as well as its own. It naturally follows that the actual sales and the predicted ones for each succeeding year must be compared in order to help determine the probability for future sales, all of which helps to determine company policies.

Production Methods and Research

Production methods are constantly improved through research, resulting in greater plant efficiency. Methods of management, organization, and manufacture must be the best, if a company is to remain solvent in the face of constantly accelerated competition. Customer demands can best be satisfied through effective planning, efficient execution of production methods, the most effectual use of plant facilities, the employment of the best qualified workers, and the businesslike purchase of needed materials and equipment.

The finances of an industry naturally consume a very considerable portion of the administrative staff's attention. The all-important task of budget making constitutes a major responsibility. Certain yearly, as well as monthly financial accounts need to be maintained, which involves comparisons between expenses, sales, and profits in the light of the total budget outlay for the year. Liquid assets, as well as all accounts payable, which sometimes result in losses, need to be recorded.

Stock levels must be known at all times. They have to be checked at regular intervals. Maximum stock levels and reordering points must be determined. Records are kept by types of goods taken in, goods shipped out, as well as the balance on hand of various commodities.

Production records are important. The existing load, as well as the forward one on each department in the industry, must be kept. It is necessary to carry continuous statistical accounts of outputs achieved.

Costs must be calculated and kept up-to-date at all times. Actual costs, as well as expected costs must be estimated, together with any disparities which occur. Actual costs incurred must be itemized under such headings as materials, labor, and overhead.

Electronic Computers

Electronic computers are being employed, more and more, in administrative offices. Such computers were first used in research activities involving

complex mathematical calculations. In preparing a payroll by means of punched cards, the computer automatically selects the information in the proper order, works it out, and produces the answer. No separate sorting operations are necessary. In other words, details are fed into the machine, and it does the necessary routine work, as well as the printing of the results.

E. M. Hugh-Jones contends that:

"in a factory, automation is generally taken to mean the linking up of separate mechanical processes under automatic control."

It is not too farfetched to say that the administrators constitute the human linkage between these processes.

The punched card machine, aided by electronics, has been a most valuable asset in expediting office work. Machines punch the holes, verify the openings, sort the cards, pass them through tabulators which add, subtract, multiply, and list the information on a separate sheet. Cards can be sorted in almost any desired order, depending upon what is wanted from them.

The electric computer is having a far-reaching effect upon administrative work. More and more of the routine work is being done by computers which select information in its proper order, work it out, and produce the answer without any separate sorting operations. A linkage can be established between the computer and other office machines.

The total operation of an electronic computer involves six closely related steps:

1. Each problem is first broken down into a program, or a series of simple steps, coded and stored in the machines. They constitute the instructions to the control unit and can be stored on magnetic tape, punched cards, or tape to be "read" by the computer.

2. The coded data is then fed into the machine specially prepared on punched cards or tape. This procedure is labeled "the input method."

3. The control unit, a self-contained mechanism made up of a combination of circuits and switches, carries out the programmed instructions.

4. The storage unit, the heart of the computer, holds the instructions, the data figures, as well as the interim results.

5. The control unit instructs the arithmetic unit, which withdraws information from storage, and performs the required calculations.

6. The answers are then reproduced by direct printing, perforated tape, or sometimes on punched cards.

The machine can only "learn what it is told." It can apply instructions placed in certain form by a human being; it is able "to read" numbers placed on tape or punched cards; it can "remember" and "store" numbers; it can add, subtract, multiply, divide, and round off numbers. Where the figures of a table can be fed into the machine, it will calculate the amount of tax to be deducted from a worker's wage, and how much of the employee's wage is free of tax. The computer can look at results and can make a choice. It will print out the information where the number of stock items go below a given minimum quantity. The machine can do chains of operations. It will not only write out an answer, but it will check the answer to see that it is right.

Jobs Electronic Computers Cannot Perform

There are certain tasks which the electronic computer cannot perform. Although it has been called "the brain," it cannot think. It cannot instruct itself; human beings must determine the instructions for it. It cannot make general estimates or draw far-reaching conclusions. The machine has to be "told" when to stop; it does not know where to stop of its own accord. While it has been termed the "machine that thinks" it is of a lower order than most animals. Quite appropriately it has, therefore, been called the "moron" in spite of many operations it performs after it has been properly "informed" by human beings.

Electronic computers have, and will continue to take over the duties of office workers. Routine clerical work has proved boring to certain people and quite satisfying to others. Payrolls can now be made out in a few hours, which formerly took many days for a considerable number of clerks in a sizable factory. Summarizing quantities required late in the afternoon can now be done as they come to the plant by telephone. Computers are being rented out to cut down on the time that these expensive machines lie idle. Airports now have computers that attend to the sale of tickets by storing the information concerning bookings on a magnetic drum, and making it available to the agent by means of a teleprinter. By means of a dialing system, a store clerk can refer to a customer's account on an electronic computer before the purchaser walks out of the store.

Thus, it could very well be said that industrial administrators have automated their offices in order to keep pace with the accelerated speed of production within the factory itself.

A Guide to Better Student Teaching

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Attainment is difficult and requires much repetition; retention is an ever present problem without solution; measurement has many pitfalls and is seldom accurate. Thus, we have stated the perplexities of education. To all of this the answer is neither to give up nor to just follow along and maintain the status quo. Where there are problems existing the solution may be found by scientific and/or systematic study and analysis.

In many fields of endeavor privileges are granted to the people concerned. In all circumstances of life where a privilege is granted there also is an implied responsibility.

We come now to the privileges and responsibilities of student teaching. Provision has been made for the student to work with a well-trained critic teacher and his classes. Not only will the student teacher be working with people but also with material things of varying commercial values. Our obligations and responsibilities are manifold due to the complexities of education in the twentieth century.

In this guide we have listed some of the processes of teaching that may not

have been presented to the student, or items that may be peculiar to a particular classroom. However, the student must be aware of the fact that every problem encountered in student teaching has not been and cannot be listed in any one article or volume. It is the opinion of many critics that the alert individual will meet each problem and render an adequate solution instead of just "sweating it out" until the twelve weeks have passed.

Some of the things that are perplexing to student teachers in varying degrees follow, with a brief discussion of each.

I. Class Routine

Fall in to the work routine of the class. In most cases the instructor upon request will supply the student teacher with an outline of the course for the entire semester. Study this outline and request time for a conference, at which time you can ask sufficient questions of the instructor to give you an understanding of the entire course.

In the industrial-arts field, the nature of the work invariably dictates that the students will be doing different types of work and at various steps of completion on the same job. Therefore, the prospective teacher should not become unduly disturbed over the fact that not many boys of a group are doing the same thing.

Keep in mind that in a few weeks, at the most, *you* will be in charge of the class. Many decisions that you will be called upon to make will reflect to what extent you understand the course being taught.

II. Arrangement of Work

In all probability no two shops will have the same arrangement for presenting the work to the students. One of the most familiar methods of arrangement is by *jobs*.

Work in our graphic arts shop is arranged into jobs with number, title, and references to be studied. For most jobs copy is indicated which the student is to set in type. Each job is designed to present something new to the student. Also, the jobs are designed so that a person must have a working knowledge of, say, the first six jobs, before he can successfully undertake job seven.

Along with our consideration of work arrangement let us consider the minimum demands made upon the instructor or student teacher when he is in charge. The instructor must see to it that each boy knows the requirements for each job and has made sufficient preparation before starting to work. The instructor must be aware of each boy's activities. Is the lad working or pretending to be busy? Also, a knowledge of equipment and its use, working techniques of each job, and some of the common difficulties of students are "teaching tools" that the instructor must possess if he is to feel comfortable at his work.

III. Distribution of Basic Information

Information is the student's most important tool. Where there is a lack of information or understanding we usually find poor work, indifferent attitudes, and conduct that may be quite disturbing to others.

In some manner we must convey to the student enough information that he can have a successful work experience. The instructor is the key individual in the distribution of information. Consideration must be given to the ability of the students. How will you handle the situation when some students cannot read? How will you present the information to those that may be disinterested?

In the final analysis *you* have the class. What will you do?

IV. Techniques of Teaching

These may vary with the individual but the end product — an educated person — will be the same. For your consideration we list the following techniques or materials.

1. The teacher uses lectures, reading, demonstrating, all of which must be well preplanned.

2. *Books* — for years the standard accepted source of information. Pages, units, topics, or chapters must be sifted out and correlated with the information required for each job.

3. *Chalk board* — use it! Even though you may consider your diagrams and drawings as very crude yet the student will receive much help.

4. *Films* — it is not easy to teach from films of any type. It is very important that the instructor knows what is being presented or be able to make quick and worthwhile decisions that will help the class to get as much help from the film as is possible.

5. *Shop made teaching aids* — keep alert to the instructional helps that the students might need or could benefit from using. Students can help in developing a well-planned teaching aid.

V. Student Progression

Shall we *push* the student? Let him work at his own speed? Strike a happy medium between the two? What should we expect of the boy that does not want to work? These four very important questions must, in the end, be answered in some manner. The critic teacher cannot solve these problems for you. He may be of some assistance, of course.

A well-planned shop program will take into consideration the dull student as well as the bright.

Two primary factors will govern the rate of progression by the students. The first factor is the mental ability of the student. We have no control over this situation. We must recognize each boy as he is and proceed from there. The second factor is the student's understanding instruction. When doubt and indecision are present the student's work will be hampered. As instructors, we must make every effort possible to insure the most rapid progression possible.

At Wilson, our students are placed in groups according to their ability (homogeneous grouping). You are at liberty to inspect the scores used for grouping on the cumulative record cards in the office. Make use of every tool possible that will help you to present necessary information to the students in a manner that they can understand and have a successful experience in doing the work assigned.

VI. Standard of Work

Serious consideration of this problem will pay dividends. Teachers have been grading students for many years and present conditions indicate that we shall pass out report cards for many years to come.

In the seventh grade we usually have boys ranging in age from 11 years to 13 years. A few cases may occur where the student will be only 10 years old or as old as 15 years. At this age level motor co-ordination is not the same for all boys. Control of the hands, fingers, feet, and the body in general tend to be in large motions rather than small and controlled for the task at hand.

The above-mentioned muscular control will govern to a great degree the quality of work that the student is capable of doing. Work required for an *A* should not be so easy as to present no challenge. On the other hand, to make an *A* so difficult to attain as to cause serious discouragement among the students is not desirable either. Try to develop a range of perfection in workmanship and knowledge that will present a fair challenge for all ability levels.

VII. Shop Care or Good Housekeeping

A neat shop is not only pleasing to the eye but easy to work in. People in all walks of life may become lax in their personal work habits if vigilance is not maintained at all times.

We have provided a five-minute cleanup period for all shops. At times this is not a sufficient amount of time; therefore, the instructor must organize special times for cleanup as may be

required by the nature of work and habits of the boys. The group should be under good control during cleanup. As each student completes his cleanup duties he should then sit down and remain quiet until passing time. If a moment or two remains the time may be utilized by discussing problems that developed during the period.

Every tool should have its own place. If this condition exists then be sure that each item is in place at the end of each period.

Students need an understanding of the care that equipment should receive. Constant reminding as they work to keep the shop in good working order will also prevent loss of equipment.

Caution — guard against nagging.

VIII. The Wilson Graphic Arts Shop

A. Areas of Work
1. General type setting
2. Letter press operation
3. Linoleum carving
4. Rubber stamping
5. Silk screening
6. Book binding

B. Equipment
1. Lever press
2. Proof press
3. Paper cutter
4. Lead and slug cutter
5. Vulcanizer for rubber stamp making
6. Lead and slug cases
7. Special type cases
8. Metal rule stock
9. Lead and slug stock
10. Silk screen equipment
11. Variety of cuts
12. Carving tools and supplies
13. Reference library

The preceding list includes only the more important equipment. Many items of interest will be found by looking behind closed doors. Where a key is necessary — ask for it.

For most effective teaching, you need to be able to locate at a moment's notice any piece of equipment that might be needed.

IX. Personal Investigation and Visitation

A. For a more complete experience in teaching it is well to make a number of visits to other areas of instruction.

Visit the following areas as minimum requirements: two English classes, one math class, two science classes of different grade levels, one social science class. Before making any visit be sure to make arrangements in advance as to day and time.

A special effort should be made to visit every shop in our school before completing your student teaching.

Investigate all resources that might be in the building to aid in teaching your particular subject.

B. Administrative Personnel. Your interviews need to be to the point and fruitful for you. Use the following questions and any others that would seem pertinent as a guide during the interview.

1. What takes most of the principal's time during the day?
2. How are new books ordered? (Librarian)
3. What checks are made on irregular school attendance? Make an effort to accompany the home visitor on a home visit.
4. How are industrial-arts supplies secured? Ask the person whose duty it is to take care of this.

X. Special Outcomes of Teaching

Let no teacher of the industrial arts think that he cannot be the originator of some worthwhile teaching aid. Notice, for example, the two booklets on rubber stamp making and linoleum carving in the Wilson shop. These booklets are highly usable for seventh grade students. I am not so presumptuous to believe that these two booklets contain sufficient information as to end investigation. On the contrary, these should serve as introductions into successful work experiences which ought to lead toward more complicated work calling for further use of our reference materials.

Our galley storage cabinet was built in the graphic-arts shop. I spent much time during one school year (1953–54) designing and making working drawings. In September, 1954, the plans were completed and approved by the principal and materials purchased. With the help of my seventh grade boys I built the cabinet, largely during the first semester. A project using over 3000 wood screws is no small undertaking, but it was completed and proves to be exceedingly beneficial.

Student teaching is a climactic experience for potential teachers. Make the most of every possible experience. You will be rewarded over and over in future years as you call upon these experiences as a background for making judgments and decisions.

Television—Groundwork for Related Science

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Does the practical work in the shop prepare the student to understand the related science or should we prepare the student for a better understanding of shopwork by presenting the related science first. This is a problem that all industrial arts and vocational teachers are confronted with.

The complexity of the subject matter in the study of electronics is very evident to those who are directly or indirectly related to this field. The learner is confronted with a maze of circuit operations that he must understand. This in itself is an obstacle to overcome, but to make it more difficult he has to deal with many intangible factors such as voltage and current to mention just two. He has nothing tangible to grasp at except his previous experiences that cannot always be relied upon as they may not be related to the new situation on hand.

With these problems in mind every effort must be made to create the best learning situation possible. The course of study must follow the usual pattern of the simple to the complex: but that is not enough. Ground work must be prepared for the related science.

The learner should be exposed to mechanical skills that will provide an opportunity for him to experience the cause and effect of adjustment and

symptoms before he undertakes the study of a particular circuit.

The learner should be first introduced to the complete unit, television receiver, where he gains the experience and knowledge of diagnosing various symptoms and their relationship to the television controls or television section.

The symptoms of loss of picture, loss of synchronization or loss of deflection should be directly related to individual sections that are responsible for these functions.

The laboratory work should progress into isolating the particular stage in that section that is at fault. It is at this time that the individual circuit operations are studied.

When the student has experienced the symptom of loss of picture when he removes a tube from the video section, he is prepared to study how the signal is transferred from the grid to the plate.

When the student has experienced by signal tracing the change in amplitude between the signal input and the output he is prepared to study the principle of amplification in relationship to the vacuum tube.

The related science should be an outgrowth of the laboratory work experiences that the student has been exposed to. This is not to be confused with shop theory that provides the necessary instruction in performing the job.

Every possible opportunity of exposing the student to some tangible experience that will allow him to either see, hear, or perhaps feel, should be utilized as evidence of the function or operation of the circuit before the related science is presented.

As an example, the laboratory job is I. F. alignment. The student is exposed to an experience of adjusting the transformers of maximum output. He also observes that the output decreases on either side of this point. His technical background is limited to understanding the principles of vacuum tubes operation. The laboratory experience has served as the groundwork for the related science that will explain the relationship between gain and the value of the plate load.

The study of any components such as resistors, condensers, or inductances should not be studied as isolated parts but as an integral part of a circuit after the student has been exposed to some meaningful experience, that is related to that particular circuit.

The educational philosophy of this concept is to eliminate as much as possible the rote type of learning and substitute a logical approach that resembles a natural sequence so that learning takes place because of interest, curiosity, and not because of requirement.

Teach Them How to Solve Problems

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(With illustrations by Robert Tinkham, Assoc. Prof., Univ. of Ill.)

What are you immediately inclined to answer when asked, "What do you notice first when you see a woman?" If your answer is some specific, such as *face*, this article may be of use to you. On the other hand, if you seek further information before responding, such as inquiring whether she is approaching or departing or what season of the year it is, you are probably so oriented that this article will be of little interest.

Need for Problem Solving Approach

Individuals frequently react to problems and questions on the basis of inferred or incomplete information or by simply resorting to memorized responses. This can be blamed on communication inadequacy or a lack of creativeness, but the fault is basically mental "tunnel vision" developed by schooling and a society which emphasize "right" answers without concern for the process by which the answers are obtained. See figures 1 and 2.

For abundantly evident reasons a free and highly interdependent people in a fast-changing world have at least as great need for sure methods of finding tomorrow's right answers as they have for learning yesterday's facts. That brings us to the subject of this article: the teaching of problem solving.

Industrial arts is in the forefront of the move to increase the emphasis on problem solving in the schools. *However, greater recognition still needs to be given to the fact that the teaching of problem solving with contemporary materials, tools, and processes of industry, rather than with imaginary academic problems, is one of the valid justifications for the requirement of industrial arts as general education.* Industrial-arts programs with such a problem solving emphasis need have no fears of being crowded out of our schools. Those without this emphasis may justly shrink in number.

Nature of the Process

Sporadic efforts have been made to increase the problem solving emphasis in industrial education in the past twenty years, but much remains to be done before a proper emphasis can be found. Perhaps the most evident handicap to the further employment of problem solving has been a shroud of mystery or uncertainty that cloaks the method. This can be blamed partially on teacher education programs that con-

GEE, MR. BROWN, IF I'M GOING TO LAMINATE THIS LANDING NET OUT OF WOOD, I NEED TO KNOW MORE ABOUT GLUES, HOW TO BEND WOOD, AND THE BENDING CHARACTERISTICS OF DIFFERENT WOODS, DON'T I ?
Industrial Arts PLANNING CENTER
REFERENCE MANUALS
PROJECT IDEA
TOM JACKSON
Finkbeiner

Fig. 1

tinue the traditional approach[1] even with full knowledge that teachers will teach as they are taught. Part of the blame also must be attributed to the lack of coverage in our professional literature. A survey of indexes in the most widely used industrial arts methods texts published since World War II reveals that none devotes more than a few pages to the subject, and some do not even list problem solving.

Actually problem solving is employed daily by all. This very fact supports the need for determining the nature of the process and ways of improving results through its use. The problem solving method of teaching involves:

1. Active seeking of a pupil-teacher approved problem.
2. Having the pupil carry the primary burden in analyzing a problem, once it is identified, to find the most desirable solution.
3. Solving the problem, if possible, according to a pupil-developed and constantly-evaluated plan.
4. Pupil-teacher evaluation of the result.

Twenty years ago Struck wrote: "An important difference in goals between learning as viewed in the traditional manner and as conceived in the project procedure is that in the latter the major emphasis is upon *growth through activity on the part of the learner*. According to the older view, learning was considered a kind of a stuffing process in which the teacher acted as upholsterer, whereas the advocates of the project method look upon self-directed, though guided, activity as a major means of individual development."[2] It is evident that he viewed the project method as being synonymous with the problem solving method, and this is commonly accepted, so long as the emphasis remains on "self-directed, though guided" activity.

There is nothing mysterious about problem solving. Perhaps it is sometimes done without much reflection, but all do it daily. This is the justification for providing all with an awareness of the nature of the process and practice in consciously applying it.

Blocks to the Use of Problem Solving

An appropriate question would be, "If there is evident need for this type of teaching that has been advocated for decades, what's the holdup?" Unfortunately there is no simple answer to this question, but a good start would be to investigate the four points of view offered by Ericson as to why the problem solving method is not more prevalent.[3]

1. In most instances in mechanical work techniques and methods of working have been established through a long period of trial and experimentation and to allow students to try to discover new and better ways is a waste of time;
2. For one person who will be in a position to plan and originate work there will be two who must follow explicit directions;
3. Many students are more interested in following directions than in discovering methods for themselves and will lose interest if made to do their own planning;
4. Following established methods is the best foundation for inventing new ones.

Overcoming the Blocks

Let us examine these representative reasons why problem solving is difficult or imprudent to employ. The first reason assumes that a student needs to know only the "right" way, and therefore no other procedure need be tried. (See Figure 2.) Imagine the youngster who is faced with a tedious task who strongly suspects that he has an idea of a different way that will be easier and more effective, but the instructor simply will not allow him to "waste" his time trying it out. (The teacher is perhaps unaware of the results achieved in industry by encouraging and even paying employees to submit labor or material saving ideas.) Suffice it to say that the repressed boy will not likely be the most productive youth in the laboratory, and he also will not likely be back for another course, but then he was probably one of those ambitious types that give so much *trouble* anyway. Incidentally, do you suppose that the teacher who would forbid a youngster to experiment with methods and processes would be one of the first to complain that "we never get any of the bright students in industrial arts"?

The viewpoint that a majority cannot or will not respond to problem solving is one that does not stand the test of experimental evidence. Shada developed a questionnaire to determine student interest in original expression. The following were among his findings:[4]

1. Out of eighty-eight who returned the questionnaire, eighty-six said they enjoyed designing their own project; only two did not.
2. Seventy-eight students felt capable of designing projects; seven did not, and three were undecided.
3. Twenty-three received outside help

[1]The traditional approach refers to a teaching method based on one to six years of teacher planned and tested projects which anyone can complete without referring to any materials other than those organized by the teacher, without being confronted by any problems other than those posed by the teacher, and without expressing any creativeness beyond choosing either a light or dark oak stain or making other decisions of this magnitude.

[2]F. Theodore Struck, *Creative Teaching* (John Wiley & Sons, 1938), p. 314.

[3]Emanuel E. Ericson, *Teaching the Industrial Arts* (Bennett, 1956 edition), p. 63.

[4]John Shada, "An Experiment in Teaching Design in an Industrial Arts Shop," Unpublished Master's Essay, Wayne State University, 1950.

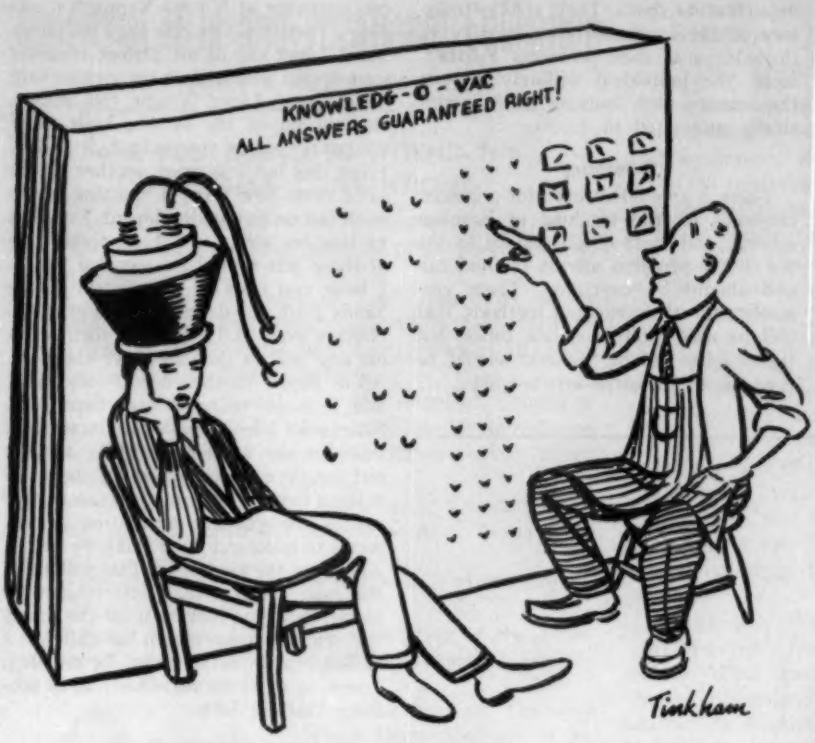


Fig. 2. Machine-like dispensed "facts" versus self and teacher guidance

in designing; sixty-five did not, and three were undecided.

Another study that dispels the viewpoint that students of lesser ability need to be "led by the hand" was done by Ray.[5] This study shows that the *directed discovery* or problem solving approach to teaching the skills and understandings associated with precision measuring with a Vernier micrometer is superior to the conventional direct, detailed method for pupils of low as well as average and high aptitude. This was true both from the standpoint of retention and transfer. Furthermore, a greater gain occurred in favor of the directed discovery over the conventional detailed method of teaching for the low group than for either the average or high group. Research in this field generally indicates that methods that achieve greatest results with normal and bright pupils also work well with slower students when the teacher works at a level that will permit achievement by all.

The third criticism of problem solving stated above presents a circular argument. It can be argued that students in some schools have been taught by the direct, detailed method, that they therefore are most familiar with it, and that they therefore resist other methods. Piaget called this developing willingness to accept authority a "desubjectification in the explanation of causality." He observed that the explanations of pupils under authoritarian teaching became more precise (and this gladdens the heart of the *strict* teacher), involved a greater degree of logic, and reflected scientific fact more closely, but that the children seemed to depend less upon their own powers to observe and question and more upon an accumulation of axioms and principles acquired from authoritative sources.[6] Can these be the total outcomes of the educative process in a democracy? On every hand is heard the plea for more creativeness, education of inquiring minds, and the need for greater individual initiative rather than blind following of tradition and instructions.

The fourth criticism above relates to the first. Few would argue the essential nature of basic fundamentals. Many would question who should identify the fundamentals for a given individual and how they should be taught. For example, advocates once could be found for a requirement that hand woodworking was

[5]Willis E. Ray, "An Experimental Comparison of Direct and Detailed and Directed Discovery Methods of Teaching Micrometer Principles and Skills," Unpublished Ed.D. Thesis, University of Illinois, 1957.

[6]Jean Piaget, *The Child's Conception of Physical Causality* (Harcourt-Brace, 1930).

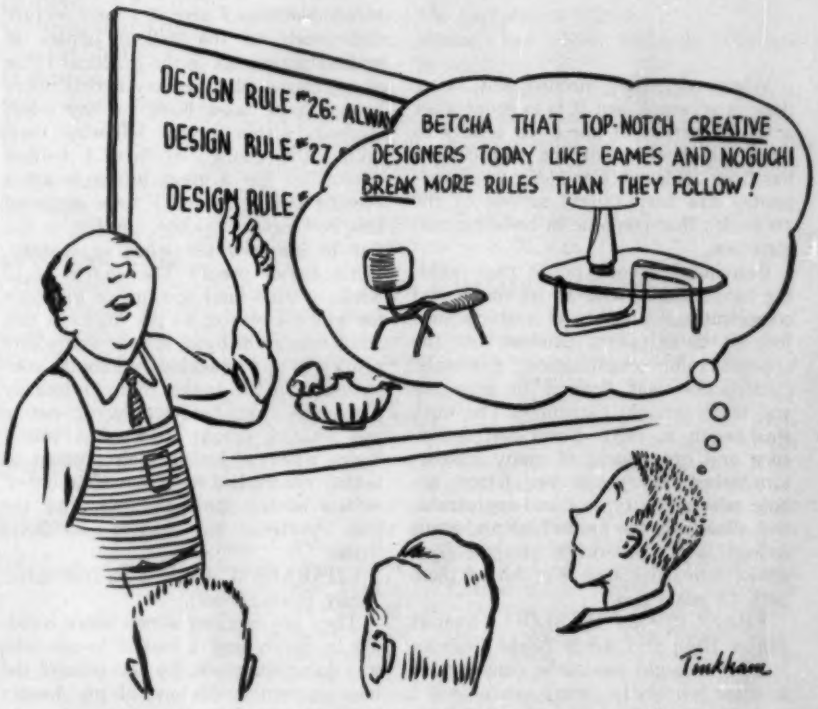

DESIGN RULE "26: ALWA
DESIGN RULE "27
DESIGN RULE "
BETCHA THAT TOP-NOTCH CREATIVE DESIGNERS TODAY LIKE EAMES AND NOGUCHI BREAK MORE RULES THAN THEY FOLLOW!
Tinkham

Fig. 3. Workable rules can be tested by students and do not need to be "forced down their throats"

essential for every student. Most would now agree that certain individuals may choose to live in steel and masonry homes with metal and plastic furniture and otherwise avoid much contact with wood. These individuals would have more imperative needs than the required hand woodworking.

The important needs of individuals are being met in the flexible industrial-arts programs that are now commonplace, and the one-channel program is coming to be a thing of the past. Facilities and programs are now being provided that enable individuals to identify and solve problems that they and their parents and teachers agree are most important to them. They achieve mastery of the fundamentals necessary to the solution of these problems. Furthermore, the individual willingly accepts the learning task because he is intrinsically motivated to do so.

Summary

There is an evident need for a greater emphasis on the teaching of problem solving, and most of the blocks to the use of the problem solving method can and should be overcome. There certainly are other teaching methods that will be used at appropriate times, but the problem solving method should be used by all industrial-arts teachers.

The Spark

O. G. HUGHSON
State Building Congress
Portland, Ore.

When something needed but never done is accomplished it is in order after a tryout period to check on results to learn whether or not the end desired has been achieved. For many years carpentry has been taught as one of the 40 trades that combine in building construction.

Convinced beyond doubt that building construction, with all its trades and complications, cannot, as a study subject fit a carpentry student for the apprenticeship examination, minimalic construction was devised to segregate and teach straight carpentry. The work was begun in 1937. From correspondence and experiences of many instructors using the system two letters are here selected as typical and representative. One from the junior high and adult college level, the other straight high school industrial arts. We started them both 12 years ago.

FRANCIS A. HUBLOU, Everett Junior High and Adult Night College:

I have taught minimalic construction in these schools for many years since I took minimalics at the Oregon State College in 1946. I decided a course in house framing would be acceptable to the public — to those adults who had no training in carpentry. I introduced the course as home construction, which was straight minimalic construction. I had the O.K. of the local carpenters' union before starting. I give a 1-hour lecture each week on the various phases of house framing. As to the practical value of my classes all I can say is that many houses have been built by my adult students within a year following their taking the course, in fact, I believe minimalics has a great future in adult evening education for I have observed this end product — the adult who has put to his own use what he learned. What better proof? The course is 10 weeks — 20 8-hour sessions or 60 hours for which I receive $4 per hour. In this adult education I can see the immediate results of my teaching minimalic construction in the junior high. Ordinarily it may be years before they can put to use what I taught them. But this I know when a junior high student is taking minimalics he is not thinking of switch blades, gang fighting, and the like. Anytime, any way I can help, write.

CHARLES W. FRASIER, Instructor, Sandy High School:

They are erecting a new store building in Sandy and I looked to see who was doing the work. Lo and behold, the boss carpenter was one of my former students in minimalic construction. In fact he is one of 4 or 5 who have gone into carpentry head first. One is a cabinetmaker at Nicolai-Neppach Company, Portland, Ore. So they are scattered. I met one of my former students from Burns who is studying architecture under Frank Lloyd Wright, this winter. He was one of the 24 who built those miniature houses you judged in Burns. From this lad I learned another of the same class now owns a sporting goods store out on Sandy Boulevard. Previous to this he was a jet flyer, flying one of those jets that flash over our heads. I have two working as printers at the Sandy Post who do most of the printing. Neither over 20. I guess it is their interest and will to do that drive them on. All of them. All they need is the spark and it is up to us to give them this. Sometimes I feel we instructors are as a voice in the wilderness crying to give our youth a trade by which they can make a living. One thing you can always say is the younger generation always seems to make out but I think we should give them the kind of lift that will make the road ahead a little less rough. No matter how you look at it all the things the scientist may dream up call for a skilled craftsman to make. In my shop I seek to so direct my efforts as to produce THE SPARK.

THE VOLT

Clarence Sparks
Woodstock, Ill.

Like a lion in a cage,
Its potential is to rage.
Think that it's a little tame
And you have no one to blame
For the way that you are all
Damaged by its tooth and claw.
Though it be a little cub,
It might swing a hefty club
That can jolt you to your toes —
And turn them up. No one knows.

Watch the lion tamer go
In the ring upon his toe.
With his chair and with his gun,
He's not there to "have some fun."
Ever ready and alert.
He's not likely to get hurt.

* * * * *

Don't be scared, but have some fear.
It can set you on your ear.

Porch furniture of wicker or bamboo should be cleaned before the "porch" season starts. A thinned coat of fresh, white shellac that is pure will protect the clean wicker or bamboo from dirt.

— *Shellac Information Bureau.*

On October 29, 1867, the United States troops under Col. J. O. Davis, United States Army, occupied Sitka, Alaska. — *Wisconsin Military District.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

ARE YOU GOING TO ATTEND THE 1959 AIAA CONVENTION?

THE American Industrial Arts Association convention at Long Beach, Calif., will stage some 23 programs that should not be lightly missed.

The 21st annual "Coming of Age" convention of the American Industrial Arts Association will be held April 22, 23, 24, and 25, 1959, at the Hotel LaFayette and Municipal Auditorium, at Long Beach, Calif.

The 10th annual convention of the American Council of Industrial Arts Teacher Education and the 9th annual convention of the American Council of Industrial Arts Supervisors will be held on April 22 and 23.

The Annual meeting of the AIAA Safety Committee and National Safety Council will be held on April 23, at 10:30 a.m.

The annual yearbook luncheon will be held on Wednesday, April 22, at 12:00 noon.

The theme for the 21st annual convention of the American Industrial Arts Association will be "Industrial Arts for the Exceptional Learner."

The opening general session will be held on Thursday afternoon, April 23, and C. Thomas Dean, professor of industrial arts, Long Beach State College, will be the chairman.

Kermit Seefeld, University of California Santa Barbara, will make the opening address.

Planned tours: Cavalier Foyer, Lafayette Hotel.

Chairman: Glenn Warrick, supervisor of industrial arts, Long Beach Unified School District, Long Beach, Calif.

Tour No. 1 — Television Program — Hollywood.

Hosts: Richard Chard and Jack Freeman, Long Beach Unified School District, Long Beach, Calif.

Tour No. 2 — Disneyland.

Hosts: Edward Hambly and Charles Copeland, Long Beach Unified School District, Long Beach, Calif.

Tour No. 3 — Visits to the following Long Beach Schools: Marshall Junior High School, Millikan Senior High School, Long Beach City College, and Long Beach State College.

The second general session will be held on Friday, April 24. Chris Groneman, co-ordinator, Council on Teacher Education, Agriculture and Mechanical College of Texas, College Station, Tex., is chairman.

Speaker: Kenneth Perry, chairman, division of the arts, Colorado State College, Greeley, Colo.

Subject: "Contributions of Industrial Arts to the Education of the Exceptional Learner."

BREAKFASTS AND LUNCHEONS

ACIATE — Wednesday, April 22, 12:00 noon, Cavalier Room, LaFayette Hotel.

Phi Delta Kappa — Thursday, April 23, 12:00 noon, Cavalier Room, LaFayette Hotel.

AIAA State Representatives and Membership Committee — Friday, April 24, 8:00 a.m., Cavalier Room, LaFayette Hotel.

Committee Chairman — Friday, April 24, 12:00 noon, Cavalier Room, LaFayette Hotel.

Epsilon Pi Tau — Saturday, April 25, 8:00 a.m., Supper Room, LaFayette Hotel.

1959 AIAA CONVENTION EXHIBITORS

The commercial exhibits are an important phase of this convention. The exhibitors have the latest and finest in tools and equipment, instructional supplies and materials, and texts and reference books on display for the visitor's inspection and evaluation.

The American Council of Industrial Arts Supervisors and the American Council of Industrial Arts Teacher Education will hold a joint meeting at 2:00 p.m., on Wednesday, April 22, on the subject "Project and Problem Solving in Industrial Arts Education."

At 7:30 p.m., on Wednesday the theme for discussion will be "Evaluation and Improving Industrial Arts Teacher Education Facilities."

Dr. Ballentine Henley will be the keynote speaker at the opening session of the Industrial Arts Association convention on Thursday, April 23, at 1:30 p.m.

The AIAA and the National Safety Council will hold a joint session on Thursday, April 23, at 10:30 a.m. Eye Safety, Industrial Education Safety will be the subjects of discussion.

At 6:00 p.m., the planned educational tours will be held.

At the Friday morning meeting five discussion groups will discuss "What Specific Things Are Done in Industrial Arts for the Exceptional Learner," "How Can the Exceptional Learner Be Reached," "Industrial Arts Scholarships on the National Level," "Industrial Arts and the Increased Demand for More Technicians and Scientists," and "Developments Needed in Industrial Arts in View of Present Trends."

The 1:30 to 3:30 p.m., session on Friday will be devoted to the discussion of five topics on helping industrial-arts teachers understand the exceptional learner.

At the evening session Rev. Bob Richards, Olympic champion, will give the address.

On Saturday morning the theme "Exceptional Industrial Arts Program for the Exceptional Learner" will be discussed.

At the 11:00 a.m., meeting Saturday, there will be an industrial-arts student meeting. At 3:30 p.m., demonstrations will be given by master teachers.

The annual banquet will be held at 6:00 p.m., on Saturday, and the Ship's program at 8:00 p.m.

1959 SUMMER SESSIONS

San Jose State College — San Jose 14, Calif. Intersession, June 15–19. Regular session, June 22–July 31. Postsession, Aug. 3–28. **Colorado State University** — Fort Collins, Colo. June 22–July 17. July 20–Aug. 14. **Bradley University** — Peoria, Ill. First term, June 8–July 11. Second term, July 13–Aug. 15. **Berea College** — Berea, Ky. June 8–Aug. 1. **Wayne State University** — Detroit 2, Mich. June 22 for six, eight, or ten weeks. **University of Minnesota** — Minneapolis 14, Minn. First term, June 15–July 18. Second term, July 20–Aug. 22. **New Mexico Western College** — Silver City, N. Mex. June 8 to July 31. **State University of New York. Teachers College** — Oswego, N. Y. Regular session, June 29–Aug. 7. Postsession, Aug. 10–21. **New York University** — Washington Square, New York 3, N. Y. Intersession, June 8–July 3, Summer session, July 6–Aug. 14. **Oregon State College** — Corvallis, Ore. Summer session, June 22–Aug. 14. **The Pennsylvania State University** — University Park, Pa. Intersession, June 8–June 26. Main session, June 29–Aug. 18. Postsession, Aug. 10–Aug. 28. First six-week session, June 8–July 17. Second six-week session, July 20–Aug. 28. **Milwaukee School of Engineering** — Milwaukee 1, Wis. New classes begin each quarter — September, January, March, June. **Stout State College** — Menomonie, Wis. Summer session, June 22–July 31. Postsession, Aug. 3–Aug. 14.

Problems and Projects

WALL PIECE

ELMER B. MATTSON
Industrial Arts Instructor
Hoover School
Redwood City, Calif.

Wildlife scenes are fascinating. For nature gave these creatures both beauty and speed to adorn the countryside. The thrilling moment of seeing a dashing buck deer crashing the timberline, is a moment many an ardent hunter relives. Thus, this design of the forest becomes the basis of a potential wall piece.

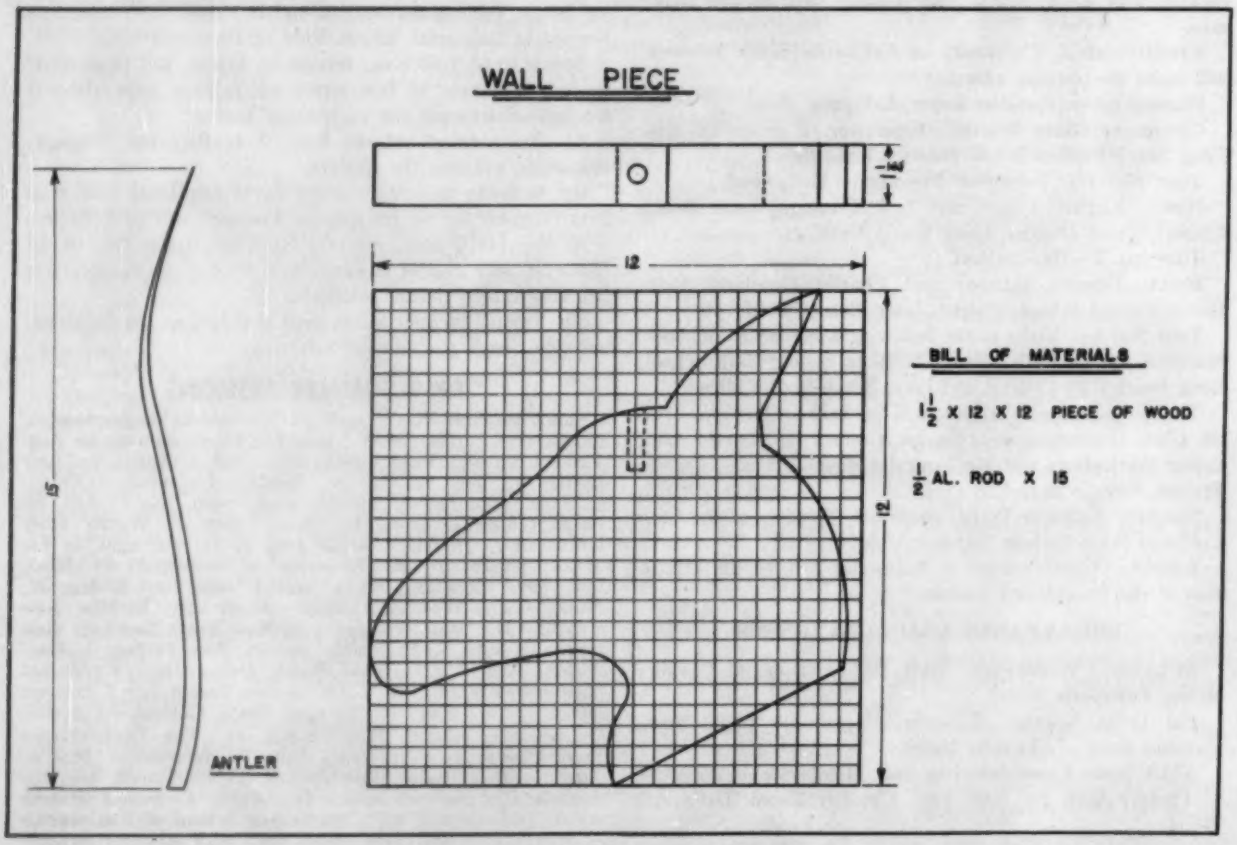
Using 1½ in. thick wood for the basic project, begin developing the general shape of the deer as indicated in the drawing. Use a large sheet of drawing paper and draw squares to make this development easier.

Once the design has been completed, transfer the design onto the wood stock. The cutting operation can be done easily with a jig saw or a band saw. After the project has been cut out, begin to file and blend the face edge, leaving the back side as it is for a flat fit against the wall.

Wall piece

The antler is made of ½ in. diameter aluminum rod. Cut the aluminum rod to a length of 15 in. Begin to taper one end of the rod approximately 4 in. down. Using an aluminum file, this becomes an easy task, other files will take somewhat longer. Once the taper has been made, bend the antler to the proper shape as indicated in the illustration. The bending operation can be done on the end of an anvil. Remove the hammer marks with a fine metal file. The antler can be buffed or left a sheen finish whichever effect is desired.

The eye of the deer is made of 2024 aluminum (24ST). The shape of the eye can be made in many various shapes. The



Details of the deer wall piece

one illustrated is beveled with dimensions of ½ by ¾ by 2.

The project should be finished with a sealer, 3 to 4 coats of lacquer, and a final coat of black for an eye appealing finish. A bracket or a wire fitting should be added for hanging the project.

BABY FOOD JAR HOLDER

RICHARD H. REICHENBACH
Franklin Park, Ill.

The jar holder was designed to use a 4¾-oz. baby food jar. For the junior size jars the same design can be used by increasing the distance between the second folds on the top.

This metal project is well adapted to the industrial-arts shop which does not have sheet-metal equipment. It requires only a steel rule, a scratch awl, a tin snips, a block of ¾-in. thick hardwood, a piece of ¼ by ¾ by 2½-in. steel bar, a wooden mallet, and a vise.

For the beginner the project covers the basic elements of sheet-metal work.

Fig. 1. Detail of back of jar holder.

Fig. 2. The jar holder in use.

Fig. 2. The jar holder in use

THE RESISTOR PROBLEM AND GOOD TEACHING

MAURICE W. DAVIS
Redding, Calif.

Keeping track of small resistors and condensers in the shop is no small job when students are young, inexperienced, and new to the field. Especially is this so when such parts are so attractive and necessary to young amateurs or experimenters. Many just seem to evaporate.

A lot of teaching is being done these days with *kits* made up of various sundries and accessories that can be assembled into any one of a number of operating projects. After their usefulness is past, they can be dismantled and the parts reused.

Each kit should include an itemized list of all parts. Good teaching should direct that one of the first operations should be an inventory of all parts by each student.

The use of the ohmmeter can be introduced in checking the *actual* value of the resistor as compared with the value as *indicated* by the color code. Such things as per cent tolerance among the various types can also be introduced.

As soon as the correct value is determined, it can be written on the face of a small piece of cardboard — lengthwise of the corrugation — and one of the wire ends of the resistor inserted in the hole in the edge of the cardboard opposite the number of ohms. After this operation is repeated for all resistors and small condensers in the kit, the student can see at a glance just what part is called for in the diagram and where it is in his kit.

Let me call attention to the fact that there is no intention in this organizational method of discouraging the use of learning of the color code — quite the contrary. As a teaching aid your imagination is the limit.

Where radio-laboratory groups are small and individual attention — to a certain degree — is possible, the card makes an ideal testing device in the learning of the color code. Here is how it operates.

Small pieces of cardboard, of the corrugated variety, are cut to a uniform length and width. By the use of the office ditto or mimeograph machine, any number of combinations of resistor sizes can be imprinted on sheets of paper and trimmed to the same size as the cards. These sheets are cemented to the faces of the cards opposite the holes along the edge. Each card is numbered for easy identification. Each student is then handed a number of resistors exceeding the number of sizes designated on the card. He must fit the resistor in the hole opposite its proper designation and thus eliminate those uncalled for. By a combination of several cards, the practice can be varied. Personal experience has indicated that many students prefer this type of test over the conventional written variety. Test keys can be made to fit directly over each card giving the proper color combination for each answer.

Attention should be called to the fact that the holes in the corrugated paper (cardboard) should be small enough so a small bend in the wire on the end of the resistor will keep the resistor tightly in place. There is nothing more discouraging

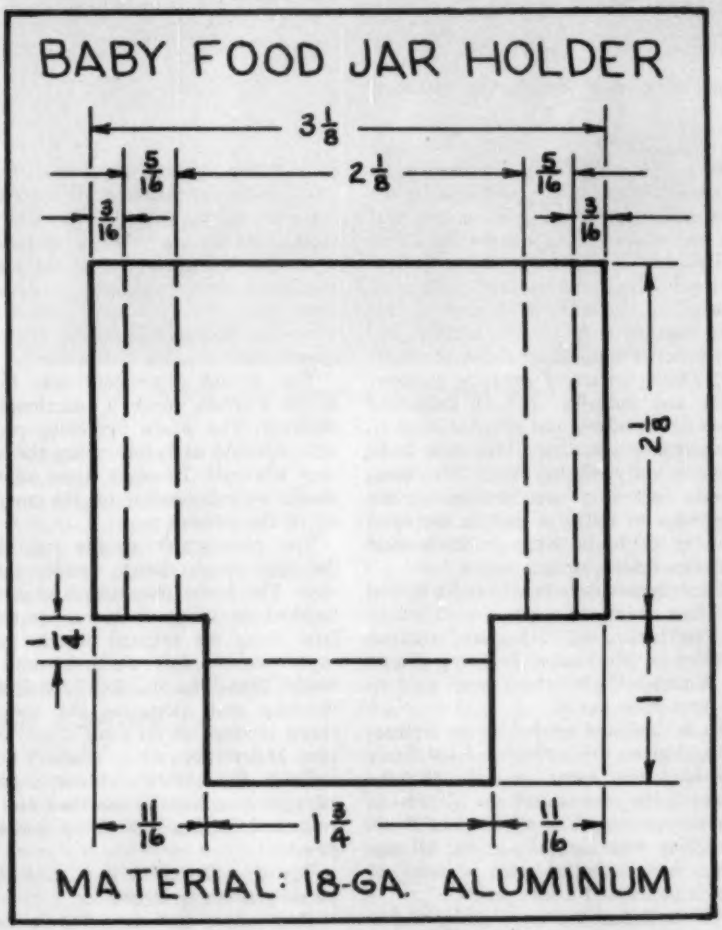
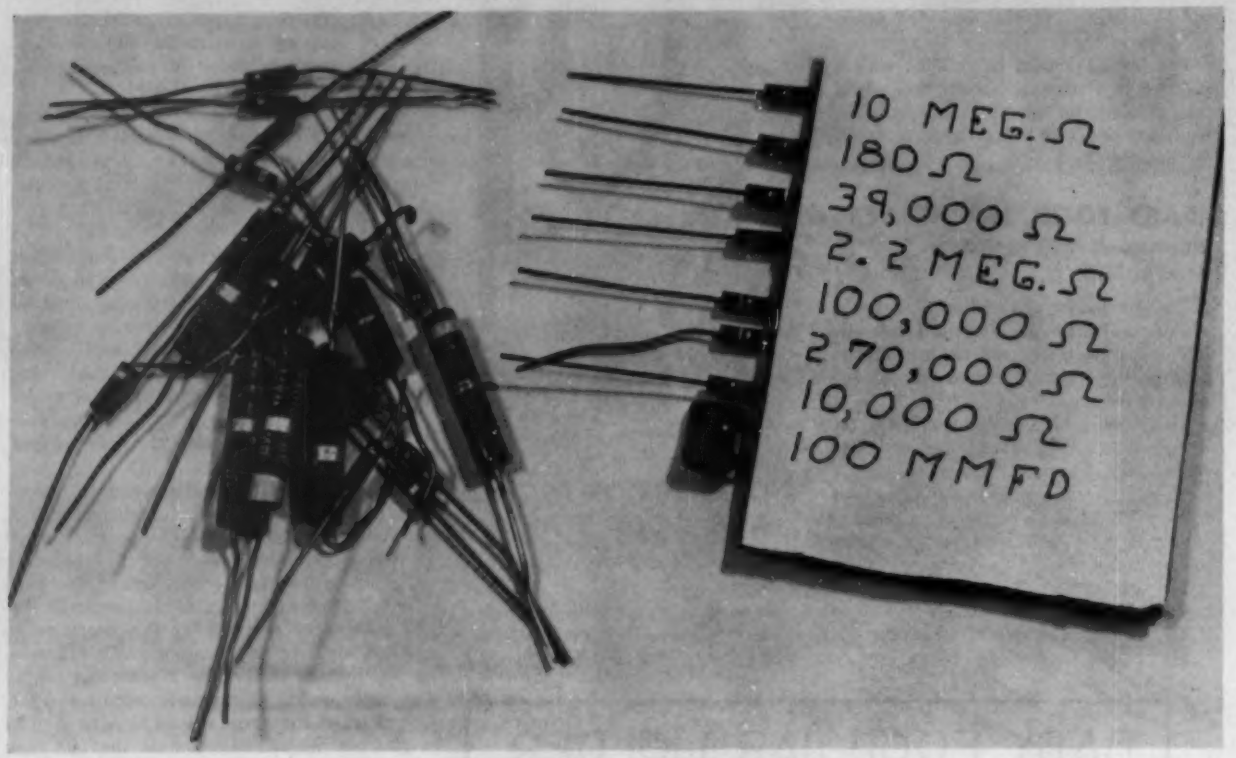


Fig. 1. Detail of back of jar holder



Evaluating and identifying resistors

to a student than to have his resistors all in place just to fall out when the card is handled. A trip to the rear of most grocery stores will provide enough boxes to make enough cards to supply for all times.

Primarily, however, the card is intended as a working part of the kit. Its purpose is to prevent loss, save the time of the student and instructor in looking for the same resistor more than once, and at the same time be an attempt to instill in the student some of the rudiments of good housekeeping.

BRAIN SKETCHING

EDWARD R. ROBERTS
Drafting Instructor
Whittier High School
Whittier, Calif.

Sputniks, Jupiter C's, Vanguards, and new management techniques together with an increased interest in *Brain Storming, Think,* and automation have indicated as never before a need for new techniques in visual experimentation in our drafting and design classes.

The ever-pressing problem before the teacher is to extract from the student new and fresh ideas through the media of a sketch.

It is difficult to extract a new idea from a student quickly. Students seem to dwell on the many problems of details and construction and for this reason the original idea is sometimes lost.

This article presents a new technique that will help a student bring out fresh ideas. This technique has more or less been adopted from the much publicized and practice method of *Brain Storming* and *Think,* currently used by management and industry. I have combined these two methods and adapted them to a classroom situation. This new technique is aptly labeled *Brain Sketching.* "Brain Sketching" was devised for the classroom to follow a unit in freehand drawing or to be used in mechanical drawing, design, or art classes.

Experiments were held in order to find out how successful such a plan would be. Ninth through 12th grade students enrolled in Mechanical Drawing classes at Whittier High School were used in the first pilot group.

Each class was briefed by the instructor and given the background for *Brain Storming* and *Think* in order that he would fully understand the details of this new process. The workings of *Brain Sketching* were carefully given. All students were supplied with a piece of sketch paper and a soft pencil.

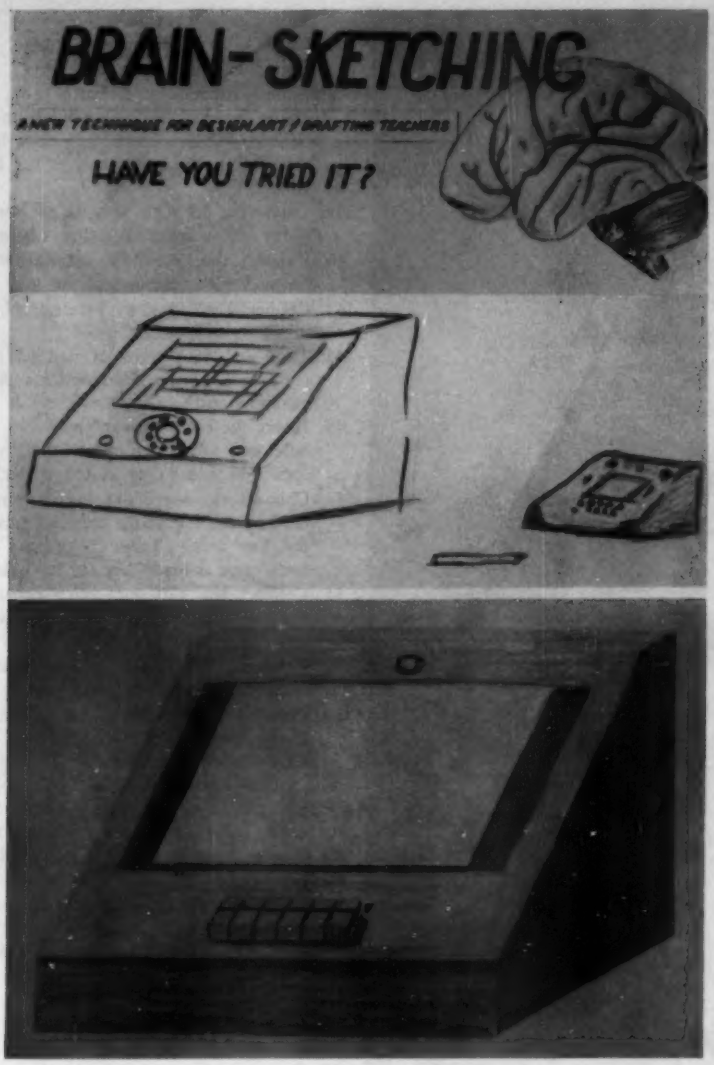
The first problem to be designed was a one-piece telephone. The students were given a two minute period of silence to think about the problem. At the end of two minutes, the direction "sketch" was given, and as many ideas as possible were sketched on paper. At the end of the sketch period the order to stop was given and all papers were turned over to await instructions about the next experiment.

The second experiment was to redesign a spoon, make it functional yet different. The *Brain Sketching* process was repeated as before using the same time intervals. However, time intervals should vary depending on the complexity of the problem.

The photograph at the top shows the first rough sketch, crude, yet an idea. The lower photograph shows the finished rendering that was developed later from the original sketch. In all experiments to date, we have found that Brain Sketching induces constructive thinking and motivates the inexperienced student to do some creative design. Many times we as teachers underestimate the abilities of our students, we tend to adhere to the hard and fast rules and are hesitant to try something new.

Try this method — it is a challenge yielding amazing results.

Here are a few suggested items for your first experiment.



Trying out brain sketching in the drafting room

1. Vertical door pull
2. Hack saw frame
3. Any small kitchen utensil
4. A fork — a spoon
5. Safety razor
6. Bottle or another type container
7. Toothbrush holder
8. Counter top sugar dispenser

ONE-STAGE TRANSMITTER

GEORGE J. BROWN
Springfield, Mo.

If you are looking for a simple, economical, and useful electrical project, the transmitter described here is believed to be the answer. This one-stage transmitter will operate very successfully. The one stage represents a simple oscillator used as a transmitter. The output, with 250-350 VDC, will be approximately 15 to 20 watts. With a suitable antenna, 15 watts will provide some very rewarding long distance contacts on 40 meters.

Cost is always a factor in electrical projects. The cost of this transmitter is not great, and a sizable reduction will result by the substitution of used parts. The tube, 6L6, is found in common power applications. Little trouble should be encountered in obtaining this tube, however, a 6V6 may be substituted with slight reduction in output. A substitution for the variable capacitor may be made as long as a suitable LC ratio is maintained. The coil is wound by a rather unique method which is very adaptable to the shop situation. This method has found wide use in many of the older radios. With a raid on the junk box, the cost will be well under $5.

The usefulness of this project is shown by the close relationship of shop objectives to the benefits derived from radio amateur work. This relationship is significant and deserves the teacher's careful consideration.

Assembling, layout, and wiring are adaptable to average shop conditions. The project has been used successfully and little difficulty should be encountered in its construction.

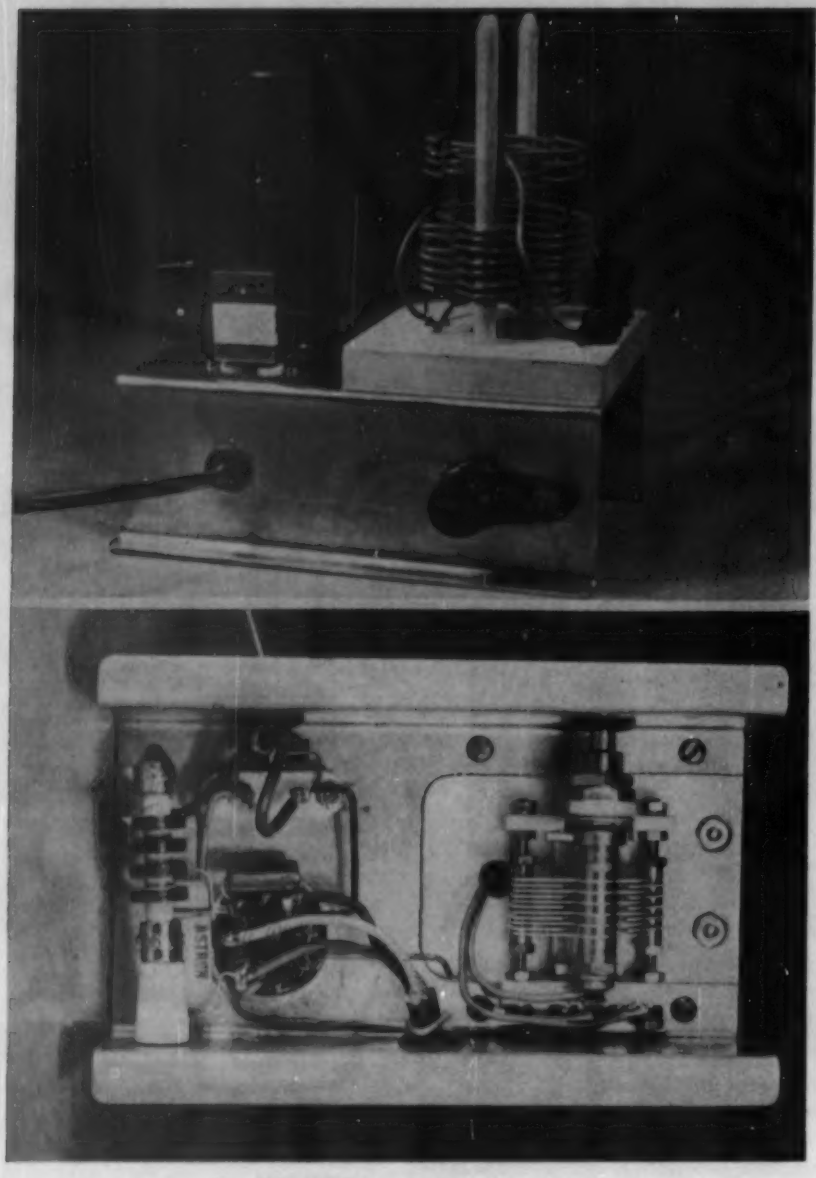
BILL OF MATERIAL

Quan.	*Item*	*Size*
1	Aluminum	14 ga. 6 x 8
1	Wood	⅜ x 3 x 3
1	Resistor, carbon	2.2 meg.
1	Choke, RF (National R-100U)	2.5 mh.
1	Capacitor, mica	470 uufd
1	Capacitor, paper	.01 ufd 600V
1	Capacitor, variable (National Type ST 50)	50 uufd
1	Tube	6L6 or 6V6
1	Socket, tube	Octal
2	Post, binding	9/16 in.
1	Socket, crystal	Miller Type 33102
3 ft.	Cord, lamp	Parallel
3 ft.	Cord, rubber	3 conductor
3	Grommets	½ in.
8 ft.	Wire, hook-up	No. 18
1	Knob	To fit variable capacitor
12 in.	Rod, dowel	¼ in.
4	Screws, sheet metal	No. 6–⅜ in.
2	Screws, machine	No. 4–½ in.

Plan of Procedure

Chassis Layout:

1. Secure suitable material for base. (16 ga. aluminum)
2. Square material to 6 by 8 in.
3. From each 6 in. edge lay out ½ in. fold line on front of chassis.
4. From each 6 in. edge lay out 2½ in. fold line on inside of chassis.
5. Lay out power cord hole on rear apron of chassis.
6. Lay out key cord and tuning capacitor holes on front of the chassis.
7. Lay out tube socket hole and scribe a 1 9/16 in. hole.
8. Lay out crystal socket holes.
9. Lay out 2 by 3 in. hole opposite tube socket hole.
10. Lay out 4 coil block mounting holes.
11. Lay out choke mounting hole.
12. Drill the ¾ in. power cord, key cord, and capacitor holes.
13. Drill a ½ in. hole or larger in center of tube socket hole.
14. Drill 2 No. 35 crystal mounting holes.
15. Drill 2 ⅜ in. crystal socket holes.
16. Drill ½ in. holes tangent to the corners of the coil-block-cut-out.
17. Drill 4 ⅛ in. coil block mounting holes.
18. Drill ⅛ in. choke mounting hole.
19. File out tube socket hole to fit octal socket.
20. Cut out coil-block-cut-out (tangent to ½ in. holes, step No. 16).
21. Fold ½ in. chassis foot outward.
22. Fold 2½ in. chassis fold that is adjacent to foot (step 21).



Two views of a one-stage transmitter

23. Fold additional 2½ in. chassis fold.
24. Fold additional foot outward.
25. Round corners of ½ in. foot to remove sharp edge.
26. Clean metal of unnecessary marks.

Coil Block:

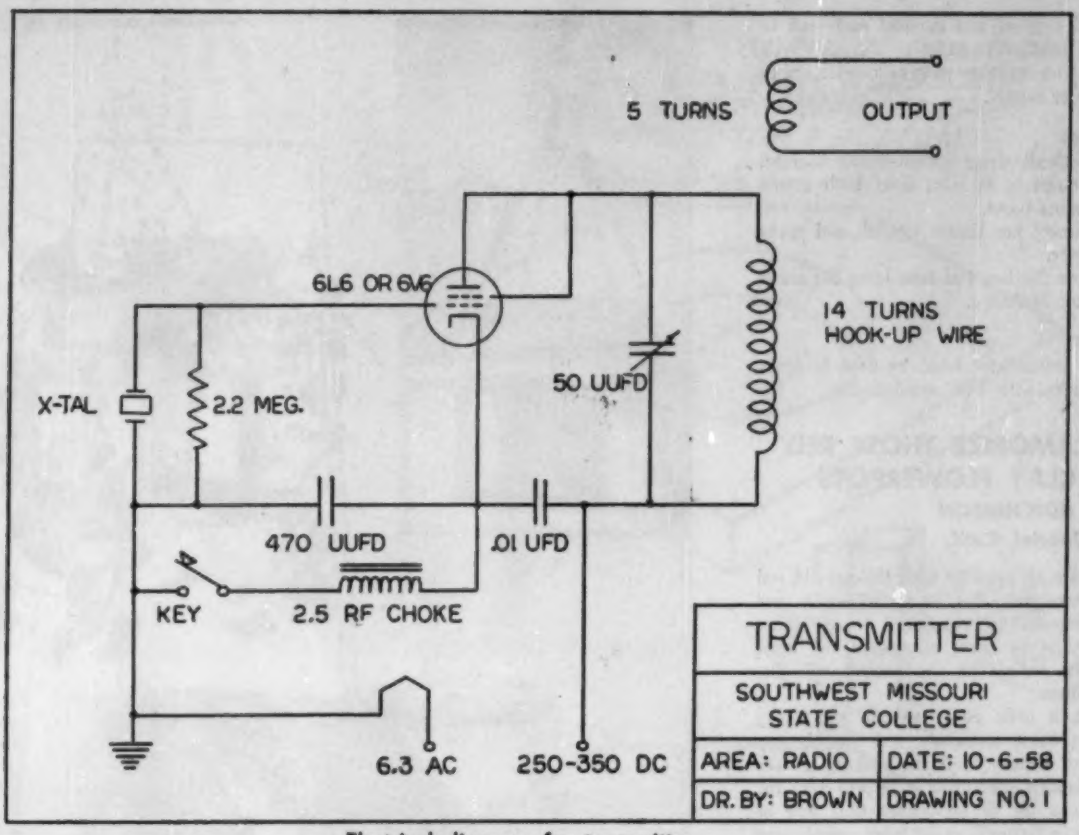
27. If necessary, plane block to ⅜ in. thickness.
28. Cut and square material to 3 by 3 in.
29. Lay out terminal post holes.
30. Lay out capacitor mounting holes.
31. Lay out coil support holes.
32. Lay out wire pass through hole.
33. Drill 2 ⅛ in. terminal post holes.
34. Drill 2 ⅛ in. condenser mounting holes and countersink with 5/16 in. drill ¼ in. deep.
35. Drill 2 ¼ in. coil support holes ¼ in. deep.
36. Drill ⅜ in. wire pass-through hole.
37. Sand and prepare block for finish.
38. Apply penetrating finish.
39. Mount coil block to aluminum chassis by means of No. 6 ⅜ in. sheet metal screws.
40. Cut 2 pieces of ¼ in. dowel rod to 4 in. long and mount in coil support holes.

Transmitter Wiring:

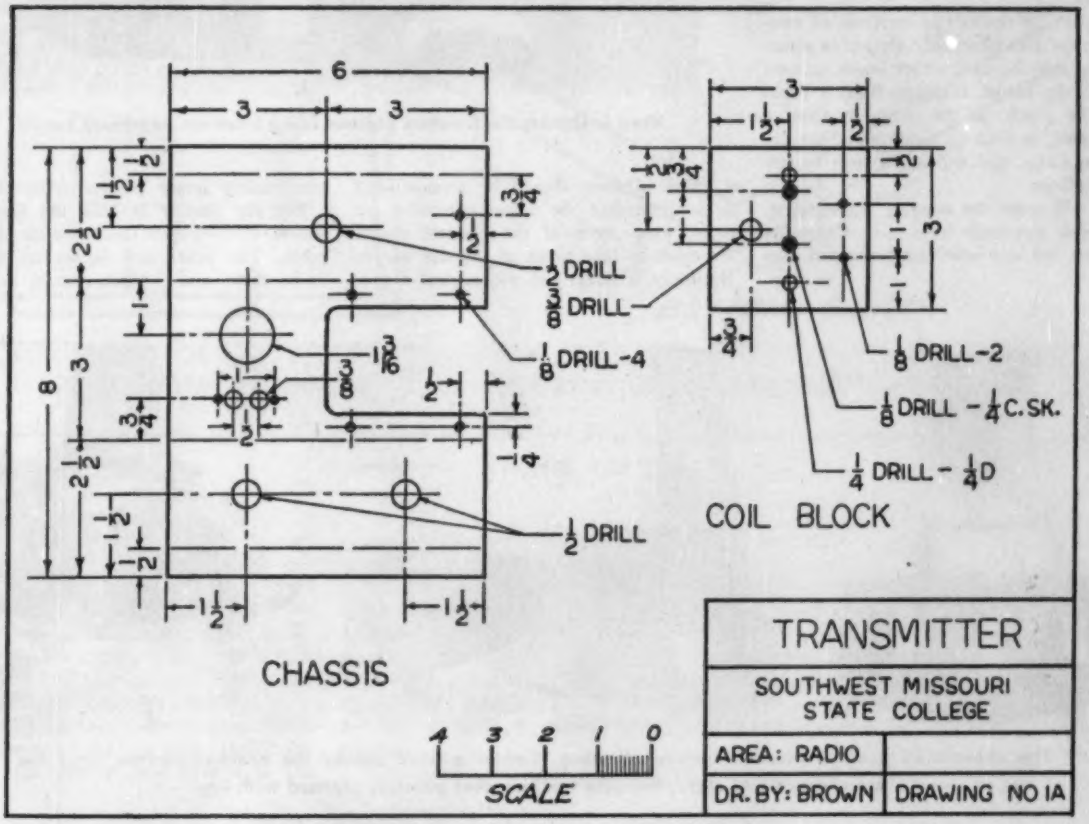
41. Mount tube socket by means of ring clips.
42. Mount crystal socket.
43. Place 3 ½ in. grommets in key, condenser, and power cord holes.
44. Mount capacitor on bottom of coil mounting block and place knob on capacitor. (This is important since both sides of the capacitor carries the high voltage.)
45. Connect a 2.2 meg ½ watt carbon resistor across lower crystal socket holes.
46. Connect the crystal socket nearest to the end with tube socket pin 5.
47. Connect the opposite crystal socket terminal to tube socket pin 2.
48. Take a 3 foot piece of parallel light cord and tie an Underwriters Knot near one end.
49. Insert the cord through the ½ in. key hole, and solder one end to the crystal socket terminal nearest the center.
50. Connect the remaining end of parallel cord to the RF choke terminal nearest the key hole. (Trim choke wire and connection is made directly to choke.)
51. Connect the 470 uufd mica capacitor between the lower holes on tube socket pins 2 and 8.
52. Connect the .01 ufd paper capacitor between tube socket pins 8 and 6.
53. Connect the remaining lead of the RF choke to tube socket pin 8.
54. Connect the stator of the 50 uufd variable capacitor to tube socket pin 6.
55. Connect tube socket pins 3 and 4 together with a short piece of bare wire.
56. Connect pin 4 to the opposite side of the 50 uufd variable capacitor.
57. Connect a short length of 3 conductor rubber cord to pin 7 (6.3 VAC), pin 6 (250–350 VDC), and pin 2 (Minus 250 VDC and 6.3 VAC).

Coil:

58. Secure a scrap piece of wood.
59. Draw a 1⅞ in. circle on the scrap block.
60. Divide this circle into seven equal parts.
61. Drive seven No. 8 finishing nails on the division marks.
62. Secure a piece of No. 18 solid hook-up wire and weave the wire between the nails until 14 turns have been secured. (Leave about a foot of wire at each end.)
63. Tie the coil at several points with string by inserting the string along side the nails.
64. Remove the coil.
65. Wind a similar coil with 5 turns.
66. Mount the large coil by means of one coil support and insert the ends through the ⅜ in. hole in the coil block.
67. Connect the two ends on the connections previously made on the capacitor (step 54–56).
68. Mount the two binding posts on the coil block.
69. Mount the small coil on the opposite



Electrical diagram for transmitter



Electrical diagram for chassis and coil block

coil support and connect each end to the binding posts.

70. Provide suitable plug or connection to power supply.

Testing:

71. Check all wiring against wiring diagram.
72. Connect a *25* watt light bulb across binding posts.
73. Connect key, insert crystal, and apply power.
74. Close the key and tune lamp for maximum brilliance.

Notice:

This transmitter must be used in strict accordance with FCC regulations.

GLAMORIZE THOSE RED CLAY FLOWERPOTS

DICK HUTCHINSON
San Gabriel, Calif.

We are all familiar with the age-old red clay flowerpots. Not at all attractive, yet flower lovers are compelled to use them from time to time, always in the hope that the foliage of the flowers will disguise them.

With a little effort anyone can easily convert these unsightly red jars into a thing of beauty, and the making of the two planters illustrated here will give the student a bit of experience that will be of help in future to make more complicated projects.

This article shows two methods of converting the jars into really attractive planters that may be used either inside or outside of the house. Hanging from a beam over the porch, in the patio, or from a porch post, or even on a side wall, they are easy to make, and will add charm to any surroundings.

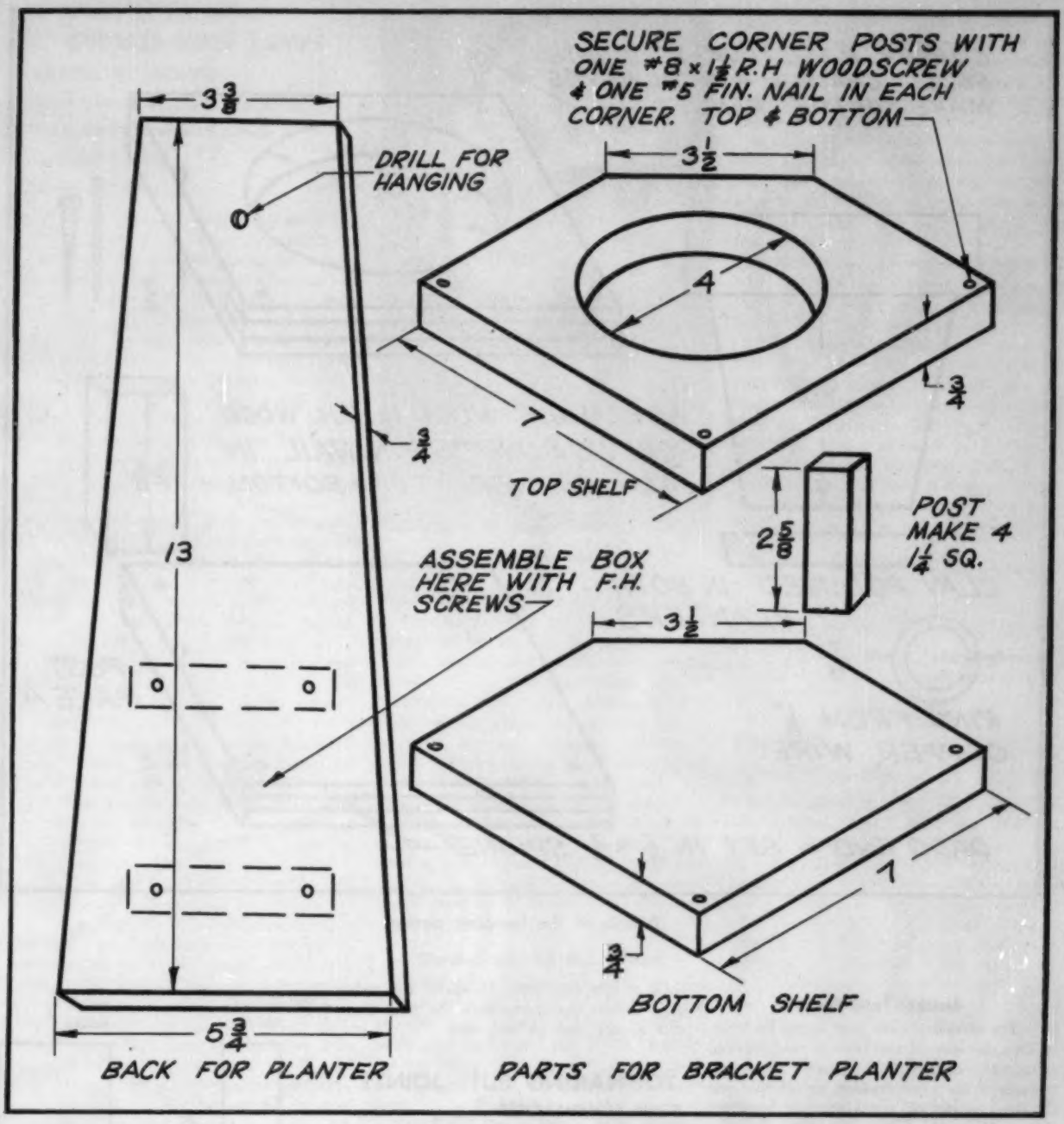
We will make the hanging planter first. This piece was made from ¾-in. California redwood, but any other kind of wood may be used.

Here is shown the finished planter hung from an overhead beam

These planters should be proportioned to accommodate the flower pots that are to be used. Both of the planters shown are made to take a pot of the size shown. Naturally, a larger pot will require a proportionately larger planter frame for it.

For the planter to take the flowerpot shown, the two shelf pieces are cut to sizes given. The bench saw is set up with a ¼-in. dado, and a ¼-in. slot ¾ in. deep

The assembled bracket planter, before planting. Center picture shows the bracket planter, and the spun saucer. At right, the side wall bracket planter, planted with ivy



Details of the bracket type planter

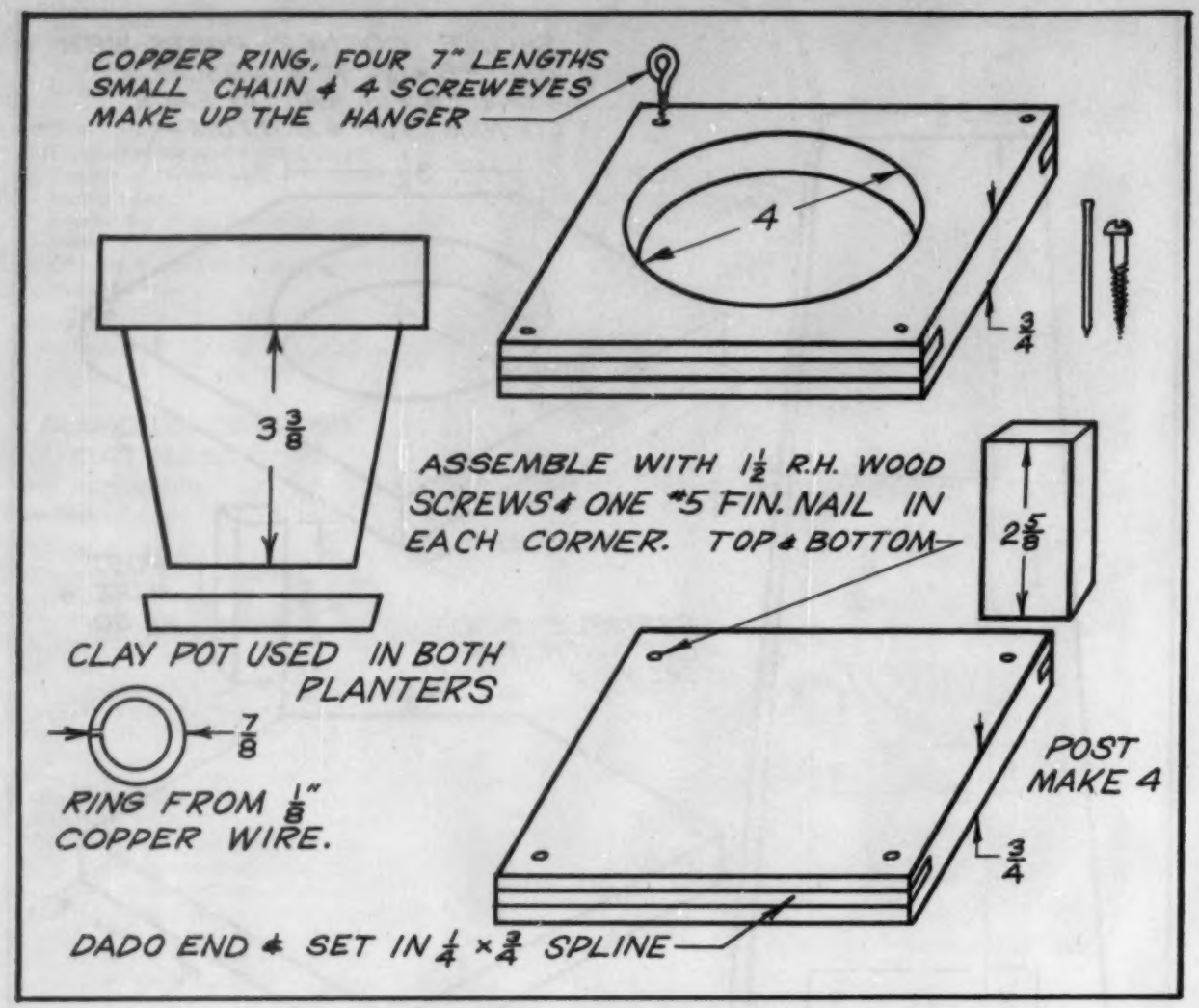
is cut in the end, across the grain in each end of each piece. Then a maple, or oak spline of the same size as the slot is glued and bradded in. The spline is not absolutely necessary, but it does eliminate the possibility of the piece splitting, or warping, and is excellent practice for anyone who has never attempted a thing of this sort.

Using the jig saw, saw out a 4-in. circle in the center of the top shelf. Drill holes to take the No. 8 wood screws in the corner of each shelf, and round the corners slightly with sandpaper.

Cut the four corner posts, and round the corners. Then assemble the box. Set a post between the shelves at each corner and secure by setting in a 1½-in. r.h. glued wood screw at each end of each post. Then drive a No. 5 finishing nail in at each corner of the posts to prevent them from turning.

Four screw eyes, four 7-in. lengths of small chain, and a single ring will be required to hang the planter. We made the rings by rolling ⅛-in. copper wire around a length of ½-in. iron pipe, thus making a ring ⅞ in. in diameter, and cutting apart.

Connect the chain to the screw eyes, and set a screw eye in each corner of the planter. Bring the four chains together at the top and attach the ring to complete the assembled hanger.



Details of the hanging planter

Bracket Type Planter

The second planter is of a bracket type. This, because of the type of construction, requires shelves 7 in. square. These are made in the same manner, except that one corner is cut off for a graceful assembly with the wall plate, or bracket.

Make the three posts, as shown, and assemble as before. Then make the back panel. Drill, and countersink from the back, and assemble the back and the wall panel with No. 8 by 1½-in. wood screws.

In our case the hanging planter is of redwood, and the final finish is a good coat of white shellac. The bracket planter is of white pine. We painted this over with a coat of leaf green oil paint, then wiped the paint off and rubbed the surface dry, after which a coat of white shellac was applied.

We spun aluminum saucers to set under each of the clay pots. However, the red clay saucers that come with the pots are just as safe, and are less work.

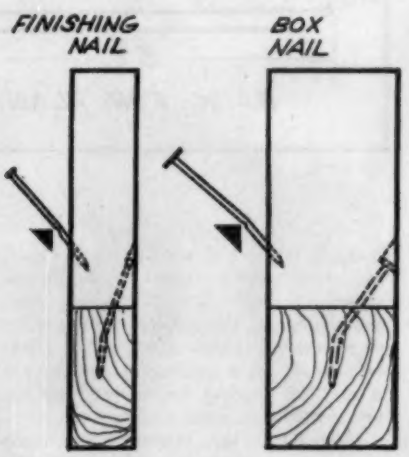
TOE-NAILING BUTT JOINTS

STAN SCHIRMACHER
Papago School Shop
Phoenix, Ariz.

Here's a "trick of the trade" that was given to me by a shop student, who had learned it from a carpenter.

In toe-nailing ¾-in. butt joints to prevent the finish nail from coming out on the opposite side, first "hammer-dent" the nail slightly near the point and it will course in a curve, as shown in the drawing. The same thing is posible with common or box nails on 2 by 4's, as shown.

If you dent the nail *too* much, it will come out on the same side.



Toe-nailing butt joint

CYPRESS KNEE LAMPS

RUSSELL G. HANSEN
Supervisor of Student Teaching
Iowa State Teachers College
Campus School
Cedar Falls, Ia.

Cypress knees are a new and delightful challenge to design for the students of industrial arts who are looking for a lamp or smoking stand of unusual character.

The cypress knees are plucked from their swampy home of the South and present themselves in many grotesque but beautiful formations. Their outstanding irregularities often require the use of an added base made of contrasting wood. With proper selection, one can obtain shapes conducive to back lighting for TV lamps, tall ones for smoking stands and a wide range of shapes for the conventional lamp base.

After selecting a choice cypress base, one must decide which side gives the most effective character of design. After making this selection, the base will often have to be cut at the bottom to have it stand evenly on a flat surface. They can best be trimmed with a fine toothed back saw.

If the lamp base offers as many possibilities for socket placement as the one herein pictured, it brings up the problem of what is the most important — the swirly design or grain pattern or the height of lamp desired. In this case, the pattern of the Cypress was so beautiful that there was little decision to be made. The higher pinnacle was somewhat crooked but it was still possible to drill a hole through for the cord, when done with extreme care.

A ⅜-in. drill bit should be used to drill out the cord hole. Bits are available in 18- to 24-in. lengths. It is possible, however, to drill from both ends with a shorter bit if the base is fairly straight. Take care not to drill through the side of the wood.

Metal tubes especially threaded to fit on lamp sockets are available at any electrical shop. They come in about two foot lengths making it possible to cut off any size required. Oftentimes five and six inches are required to give the socket, bracket and shade proper support in such soft wood.

Saw a groove on the bottom of the lamp base so that it comes out at the back of the lamp. This gives a place for the cord to come out and yet allows the base to rest flat on the table. Glue felt from an old hat or cloth to the bottom of the lamp as protection to the table top on which it is to stand.

At this point, the job is about half done as finishing the cypress knee is an all important item to consider. Rub it down with No. 2/0 steel wool or finer. Do not use an abrasive paper for this job. Sandpaper will destroy the beautiful coating of the cypress which has been so smoothly formed by the running swamp water. The swirls, bulges and varied irregularities formed by the water movement can be accentuated with various finishes. A very delightful and a more lasting finish can be produced by first applying a one-coat sealer followed by one or more coats of *Royal Finish*, a rubbed varnish finish.

Cypress lamp

Another finish that may be applied is that of ordinary paste wax. After the cypress has been gone over with steel wool, a coat of paste wax can be applied. Due to the irregularities, the wax can be better polished by buffing it on a buffing wheel.

Shade Made by the Student

Frequently a ready-made shade fits the purpose without change of structure and requires only a new covering. But more often than not, one would prefer to make his own shade to fit the base, which would be the case with the irregular cypress knee.

The frame can be made quite inexpensively from heavy coat hanger wire. Two rings can be formed in the slip roll to size desired. The ends should be butted together and hard soldered. Rib wires connecting the top and bottom rings may be spaced about six in. apart around the circumference of the shade and hard soldered in place on the inside of the rings. Hard solder four cross braces on the top with a washer in the very center to support shade above the bulb.

A cone shade also can be made for this type of lamp.

After laying out the shade pattern on paper, it can be transferred to the plastic shade material and traced. After the material has been cut, it becomes necessary to devise some way to hold the plastic material to the frame which actually is quite simple and yet decorative.

A series of holes spaced about one inch apart are punched around the top and bottom. The holes should be punched right close to the frame rings so when the shade is whip stitched with pyro-lacing, it will not slip out of place.

To determine the amount of lacing to be used, measure the lineal distance around the top and bottom rings plus 2½ times the total of these two distances.

It is usually not advisable to over-decorate with fancy shade material and bright pyro-lacing as it tends to detract from the thing which you want to accentuate — The Cypress Knee Base. The lamp pictured here does have a shade of white translucent plastic with imbedded feathers. It would appear that there is a contradiction here. However, having tried this decorative shade, it seems to be quite an asset to the lamp.

Yes, it is indeed a challenge to see just what beautiful projects can come from some of mother nature's underwater wonders. Try it and see how your students take to the challenge.

SANTOS

BEN HUNT
Hales Corners, Wis.

In the sixteenth century, the first Catholic churches were built in the most important communities of Old Mexico and of our southwest. In the Old Mexican way of life every adobe home had its shrine and a patron saint. The people built their own churches and the simple furniture, adapted to the existing environment, from the materials available. Adobe and wood, mostly cottonwood, was the material used. The need for statues of saints produced the saint makers — men who traveled from place to place, carving out the figures required. Their tools were few. A knife, ax or adze, file, and perhaps a chisel or two comprised their equipment. The figures ranged from 8 or 10 in., to life-size figures. Space does not permit showing the various methods employed by these men, and the sample santos shown are typical of this kind of folk art.

White pine was used in lieu of cottonwood in the sample pictured in Figures 1 and 2, and show how the arms were whittled separately and fastened with glue and a dowel in the traditional manner of the old santos. The birds and the cross are carved or whittled separately also, and are set into mortises as is shown. In many cases the figure of St. Francis is shown holding the cross in one hand and a skull

SANTO OF ST. FRANCIS OF ASSISI

Fig. 1

Fig. 2

Fig. 3

Fig. 4

in the other. Not being particularly happy about the skull we have used the two birds instead, since St. Francis loved all birds and animals. But the skull is shown for those who may prefer it to the birds. Note the way the hand was whittled to hold the skull in Figure 1. This was later sawed off and another left hand substituted. We felt safe in doing this since many of the old santos have been changed from their original form to meet certain requirements. Some of them even had movable arms.

One thing that probably should be mentioned is that these santos show none of the fine handiwork of modern wood carvers. In fact some of them are very crude. But they are what they are and that is what we are trying to produce here.

After sanding, most of the old santos were given several coats of gesso, which the old santeros (saint makers) made of gypsom, flour, and water. A commercial gesso can be obtained at most artist and craft supply houses, and is applied as per directions on the can. This gesso when dry imparts a smooth surface, which can be sanded for further smoothness.

Figure 3 is a photograph of this santo with four coats of gesso ready for painting with poster colors.

Water color paints are used for coloring, usually poster colors in this day and age. Flesh colors vary in the old santos. Some are almost an ivory color, others more natural. The robe in this case is a grey, rather on the dark side. Some were a soft dark blue. And some old ones have been painted and repainted, often in different colors. Many of them are rather crudely painted owing to the fact that good small brushes were not to be had. The old santeros probably chewed the end of a yucca leaf like the Pueblo Indians do for brushes for decorating their pottery. The tonsure in this case was painted dark brown, but it could be black. Since the birds are symbolic also, any color will do. The bird on his shoulder is blue with a white breast and the one on his left hand is black and white. The rope belt is the color of old rope, that is, a greyish cream or yellow. The cross is light grey.

Figure 4 shows the santo in a perfect setting for the modern home. Actually this niche was made of cardboard. My friends, the Burshears of La Junta, Colorado, had niches built in their Spanish type house just for santos to be displayed, since "Buck's" given name is Francis. As is the case with many of the carvings and whittlings in this series, one has to find a suitable place to display them.

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Saints and Saint Makers of New Mexico by E. Boyd. Laboratory of Anthropology, Inc., Santa Fe, N. Mex.

Santos from Puerto Rico, published by Edward S. Purtell, president, The Cooper Union.

Santos, the Religious Folk Art of New Mexico, by M. A. Wilder and E. Breitenbach.

At the end of the school year, books are usually repaired and cleaned. The outside covers of school books are given a thinned coat of pure, white shellac for protection.

— *Shellac Information Bureau.*

INDUSTRIAL ARTS DEPARTMENT OF LYLE HIGH SCHOOL

HAROLD H. SCHWERR

Instructor, Lyle High School

Lyle, Minn.

The new Lyle High School is situated in south-central Minnesota on the Minnesota-Iowa border. Lyle is located in the heart of the industrial, agricultural, and hog raising areas of these two great states.

Lyle High has a consolidated population of over 200 students; and offers a comprehensive curriculum, including a new industrial-arts program. The industrial-arts program has been expanded to include the necessary training to meet the problems of the ever growing industrial life in our nearby cities. The shop itself is a large, airy, general-area shop. We also have an agricultural-vocational shop area that is the newest in thinking and design.

Included in the new shop curriculum are: mechanical drawing, sheet metal drafting, architectural drafting, and machine drafting. Other new areas are: plastics, leather, elementary and advanced woodwork, electricity, art metal, and jewelry. For the future it is hoped to bring lapidary into the picture as well as such areas as foundry and graphic arts. With this all-embracing curriculum the boys of Lyle High School will be better prepared to cope with the problems that confront them in the fast-moving society of today.

Fig. 1. Two new projects

Fig. 2. Planning new projects

The new shop is a credit to the planning leaders of the Lyle community. The old shop was conducted in a half-garage and school bus location. This building was a block away from the school proper. Now, in the new surroundings, the shop is an integral part of the school.

The industrial arts department boasts of many of the newer advancements in school architecture. The interior decor is sea green, cinder block construction. It has an excellent east exposure. The shop contains excellent work and storage areas. The finishing room is spacious and well ventilated. Power for the big machines is laid into the floor and in a conduit system around the walls. The main power panel is equipped with circuit breakers to provide maximum security and safety for all concerned.

The other departments in the new Lyle High School are a spacious gymnasium that is the talk of the southern part of the state. Lyle High presents a dynamic mathematics and science curriculum. The music department includes one of the finest pep bands in this section of the state. They also have two new timpani for the school orchestra. Home economics, commerce, English, social studies, and a new audio-visual department round out our school program. The school also is equipped with the latest in cafeteria equipment.

The new school is endowed with a far-seeing and able administrator in the person of Superintendent Robert N. Overson. Under his counseling and wise guidance, backed by a school board and community that look to the future, Lyle High will grow and impart its mark on this generation and those that follow.

Fig. 3. Harold Schwerr checking up on the plastic projects

A PLANTER LAMP

WILLIAM WILDER

J. A. C. Chandler Junior High School

Richmond, Va.

The lamp illustrated here was designed as a general shop project that would involve as many areas in the general shop as possible and at the same time, remain a challenging and interesting take-home project.

In constructing it, the student gains knowledge in woodworking, electricity, art metal, sheet metal, soldering or brazing, and the feet for the lamp may be turned on the machine or wood lathe.

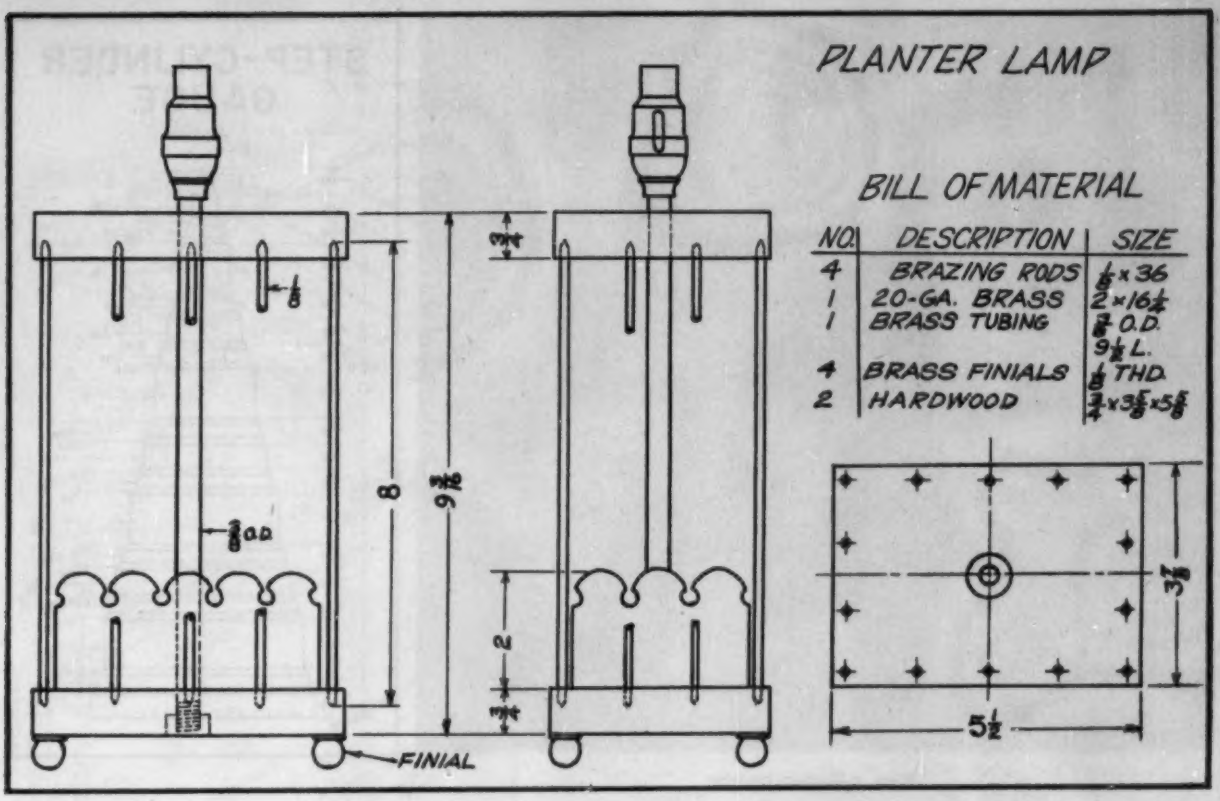
We have used this basic ideal in many variations of design, proportion, and material.

For this lamp, we have used ⅛-in. brazing rods, 20-gauge brass for the planter (for economy, galvanized metal or tin plate for the planter bottom) and lamp shade bracket finials for the feet.

The design for the planter should be of some geometric shape and designed by the student. Corners could be brazed by the advanced student but sweat-soldering is satisfactory on either a butt or lap joint.

Assuming the student has completed his bill of material and working drawing, to include a full scale paper or metal pattern, we start by selecting two pieces of wood, preferably hardwood, squaring, sanding, boring holes as illustrated and applying the desired finish. The finishing material should be applied to all parts before assembly.

Cut the brazing rods to length. The rods



Details of the planter lamp and the bill of materials needed

may have the manufacturer's name pressed on one end. These can be cut away but turning them toward the inside suffices. The rods should be filed to a slight angle on both ends to ease in assembling. They can then be polished and lacquered.

Cut out the piece for the planter from 20-gauge brass two in. wide and 16¼ in. long. With a paper pattern glued to the metal with rubber cement, or a metal template, punch and drill the holes as illustrated.

The scallops are cut as follows: With the point of the tinners snips, cut into each intersecting point, then again at 45-degree angle on a line tangent to the scallop line. Make all right hand cuts and then left. File the remaining with a smooth-cut mill file.

With the scallops completed, scribe a line on the bottom from 5/16 to ¼ in. and make V cuts for each section to be folded. Shape the planter and weld or solder the joints.

Cut the pieces for the planter bottom and drill the hole for the center rod. In this case, ⅜-in. O.D. spiral brass tubing was used. Thread both ends of the tubing, one for the socket and the other for the ⅜-in. hexagon lock nut that secures the lamp. The tubing should be welded or soldered to the planter bottom to prevent leakage when the soil and water is placed in the lamp.

Planter lamp by William Wilder

Legs for this particular proportion were almost a necessity. Allow the cord to project from either the side or the end and always at the back, regardless of where the lamp is used. Drill holes in the base ⅜ in. in from the corners and ½ in. deep. An undersized hole to take a ¼-in. machine screw will work on the finials used on this lamp. Force the screw into the hole and cut off the head. The feet can then be screwed into place.

STEP CYLINDER GAUGE

M. H. ENSOR

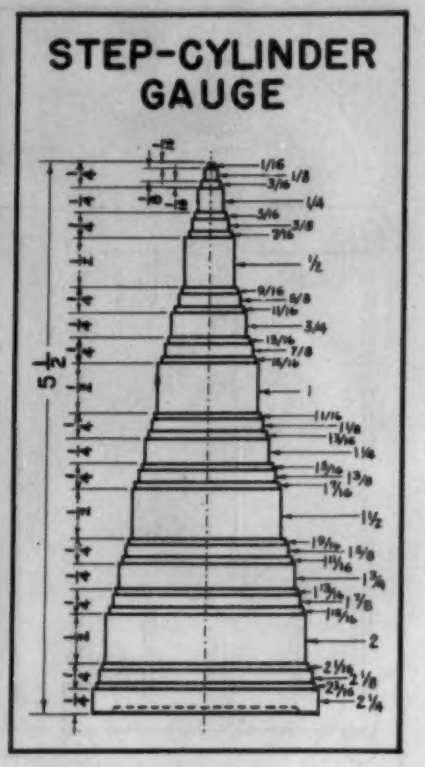
Olathe, Kans.

This may be a novel gauge but it is just the tool to set on the wood lathe so that the outside calipers may be quickly and accurately adjusted to the desired size without the aid of a rule. After using the calipers on a piece of wood they can be easily checked for accuracy by just slipping them over the appropriate step. Persons with defective vision have much less trouble with using the gauge than using the rule.

Diameters of 1/32 in. more or less can be obtained by placing one leg of the calipers on one step and the other leg on a step below or above.

This gauge can be made from a cold

Step cylinder gauge



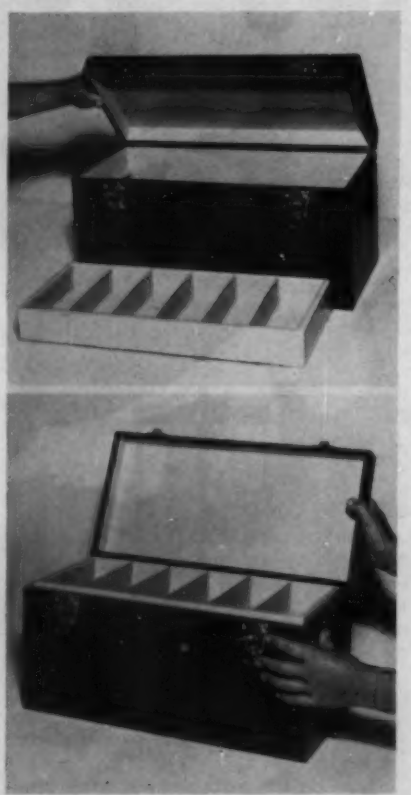
rolled steel bar about 6 in. long, and 2¼ in. in diameter, but a smaller piece would be quite satisfactory for most needs of a gauge on a wood lathe are below 2 in. in diameter. The higher the accuracy the better the gauge, but for most work on a wood lathe a tolerance of .005 of an inch is permissible. Most work on a metal lathe would require less tolerance. The bottom is undercut to allow the gauge to set solid on an uneven surface. It could be drilled and tapped to permit screwing the gauge fast to a lathe or shelf.

TACKLE BOX OR TOOL CHEST

BOB REEVES
Chula Vista, Calif.

Many shop instructors have discovered that students enjoy constructing projects that they can take home and immediately put to some personal and practical use. Building a box is one way to satisfy this urge to create a usable project, for what student does not have a need for a box of some sort, whether it is a tackle box, tool chest, or just general utility box.

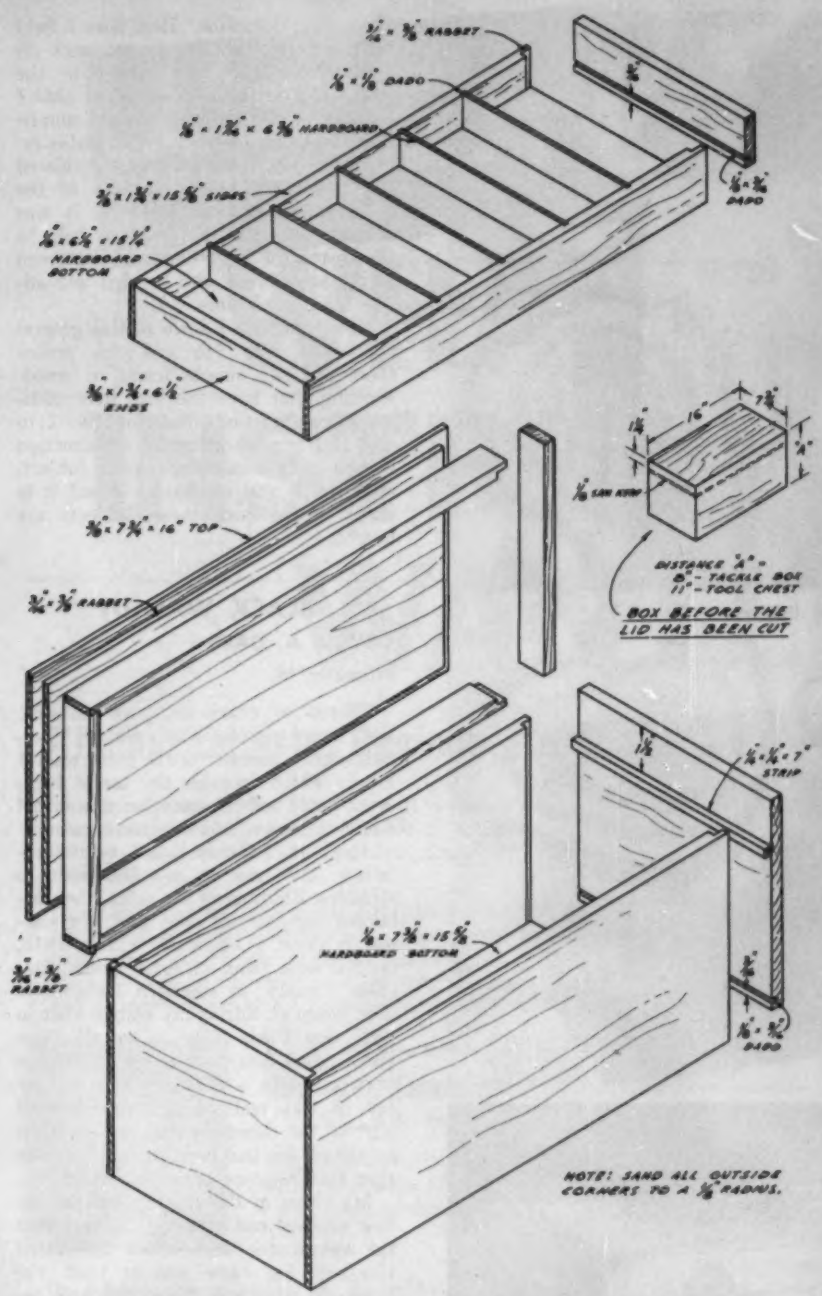
The two boxes shown here are identical in size and construction except that the height of the tackle box is 8 in. while the height of the tool chest is 11 in. Either of these boxes, in addition to being an interesting project to make, will provide the student with the opportunity to learn basic box construction. Top, bottom, and sides are all fastened together as one unit before the lid is separated on the circle saw. For the sake of sturdiness, dado and rabbet joint construction is used throughout the box and the removable tray. However, beginning students could change to simple butt joint construction if necessary. Plywood or solid stock of ⅜-in. thickness is used for the box with the exception of the bottom of the box and the tray and the tray dividers, which are of ⅛-in. hardboard.



Tackle box

Decide which box you want to make and then begin construction by cutting the sides and ends to their proper sizes. Rabbet the ends of the side pieces and cut the dados for the hardboard bottom. Cut the top with dimensions to match the side and end pieces you have already cut before you carefully measure and cut the rabbet joints around the top edge. Assemble the top, ends, and sides by holding them together to see if they fit properly. Now cut the hardboard bottom and try holding together the ends, sides, and bottom to see how they fit. When everything fits as it should, reassemble the parts with glue and brads. Check the whole assembly for squareness before you let the glue harden.

Set the circular saw blade so it just cuts through ⅜-in. material and then saw the lid apart from the rest of the box.



Details of the tackle box or tool chest. See other illustrations on page 168

Smooth the rough exposed edges with plane and sandpaper. Cut the square strips which hold up the tray and nail and glue them into place at each end of the box.

Before you start the construction of the inside tray be sure to measure the inside width and length of the box unit you have just completed. Cut the sides and ends of the tray so that the finished tray will be ⅛ in. shorter and narrower than the inside of the box. Rabbet the side pieces to receive the ends. Saw the dados for the hardboard bottom and then saw the dados for the divider strips. The hardboard bottom and divider pieces should be cut and then the whole tray unit should be assembled dry to see if everything fits properly. Reassemble the tray pieces with glue and nails. Check for squareness before you set the tray aside to dry. Plane and sand the top edges to considerable roundness and smoothness as a final step.

The finish for the box should be applied before any hardware is installed. A natural finish using sealer and varnish is shown in the photograph of the tool chest. The tackle box is an example of an enameled finish with an inside color that contrasts attractively with the outside color.

The hardware you apply when the finish is dry can be any combination of hinges, hasps, clips, handles, and corners that you prefer. You may also want a lid support to keep the lid from falling back too far when you open it. For that very personal and final touch let the students apply their own initials in decal form.

(See other illustrations belonging to this article on page 168.)

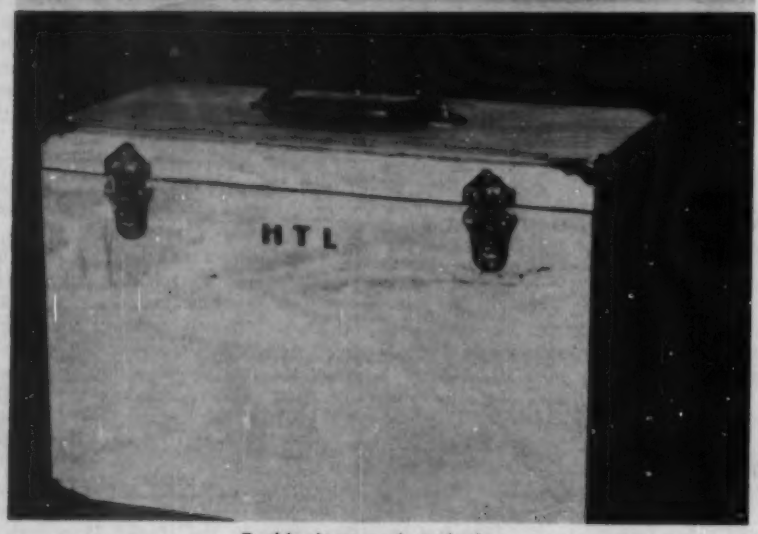
MINIMALIC CONSTRUCTION COMES OF AGE — 1937–1958

O. G. HUGHSON
State Building Congress
Portland, Ore.

Exaggeration is a not unusual trait, stronger in some than in others. Det North, who told us boys stories, told our mother when she protested, "Lady, far be it from me to tell your boys an untruth." Then he would spring something like this: "When their Congressman brought his father a package of new cucumber seed to try out his father was spading the ground where he had burned brush and the soil was warm. His father planted a hill and stepped back to view his work when he felt a tugging at his pants legs. Looking down danged if those cucumbers weren't up and their vines winding round his ankles. Surprised he stepped back, but having taken root, they grew as fast as he walked. He started to run but they grew as fast as he ran — across a 10-acre lot and when he reached for his knife so he could cut himself loose and get over the fence, there was a ripe two-pound seed cucumber in his pocket." How could we help but love him?

From observation and letters from instructors fearful I might be acquiring an exaggerated concept of the place and standing of minimalic construction — (beginner carpentry) among other industrial-arts study subjects — I requisitioned a top-line instructor and arranged a two-hour session. The object being to canvas the whole field of shop study subjects to see if we might not find some relative standing to the student and to the instructor. The ground covered included: How does minimalics rate and is it easy to teach? How do students *take to* this subject as compared with others? How do they apply themselves to the study? How does it

Sawing the lid apart



Tackle box and tool chest

affect shop discipline? How does it help 11th and 12th graders to get work on graduation? The high object in the shop — to do the *work* or learn *skills?* Relation with Apprenticeship Commission? Relation of the Lumber Industry.

Many other angles were considered but this outline gives an idea of the ground covered. For instance, it was brought out that the practical help to the instructor were nearby lumbermen to get acquainted with or visit and advise their instructors.

But it all boiled down to this general conclusion. For 7th and 8th grades there are two simple forms of woodworking that have the lead over minimalic construction. But for the 11th and 12th grades minimalic construction is tops — only one other study subject, auto repair and mechanics crowd it in shops where both these subjects are taught.

BLACK WALNUT

ORVILLE A. OAKS

Wilmette, Ill.

"Wood of character," we exclaim! But, if my piece of black walnut (Juglans nigra), member of the great walnut family which includes the useful hickories, could tell its story, no one would doubt its claim to character supreme.

About 1927 Henry Beard, my father-in-law, took me on my first visit to Grandpa Biddinger's log cabin, then occupied by his two sons and a grandson. It stood, as originally built in 1832, on the west bank of Sand Creek, Decatur County, in southern Indiana. It was, however, during my second visit in 1932 that Uncle Billy, as we affectionately called him, handed me this piece of wood with a history. And, to my joy, it was real walnut, the dovetail part of the threshold log, cut off when an old sill log had been replaced. It was then that its story began to unfold.

My count of the annual rings on the now exposed end revealed the fact that the walnut tree from which this adzed threshold log came was at least 100 years old when cut. Thus, this tree began its growth in the dawn of early Indiana history; probably during the very year, 1732, when Fort Vincennes, on the banks of the Wabash, the first permanent white settlement in what is now Indiana, was founded. And, this tree lived on, in its Indian hunting ground — many arrows being found in the fields about the cabin — until Indiana became a state in 1816, and on until the Presidency of Andrew Jackson, "Old Hickory," in 1832.

During all these past 100 years this

(Continued on page 10A)

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William A. Kavanaugh,
B.S., M.S., PhD

Assistant Professor of Electricity—Radio Electronics, University of Minnesota

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Related Content — The Daily Ten Minute Lecture

GEORGE E. STEPHENSON
George Churchill Junior High School
Galesburg, Ill.

All industrial-arts teachers will quickly attest to the importance of the related content in their courses; content that is both necessary and enriching for the student.

However, most students do not share the same enthusiasm for related content that their teachers do and this often results in the neglect of the area. With the student the foremost interest is to *work on his project* and students constantly place pressure, spoken or silent, on their teacher to *stop talking and let us work*. Teachers may unconsciously succumb to this pressure and become lax in the important area of related content. The teacher should not find himself being told what to teach by his pupils.

Teachers see this problem of presenting related content and attack it in many ways; some by intensive related content before any project work is started, some by spending one day a week on related content, some by textbook assignments given as the need arises, some by lectures spotted throughout the course, and of course, some by using a combination of the foregoing.

A method for presenting related content that has been successfully used is the *daily ten minute lecture*. In this method the teacher presents his related content every day with a short lecture. The lecture always takes place at the beginning of each class period and should be limited to about ten minutes. If the topic cannot be covered in one ten minute lecture it should be stopped at a natural place and continued the next day. The method is particularly suitable for junior high industrial-arts courses of short length, nine weeks or less.

This method has several advantages both in presenting related content and in class administration:

1. Related content becomes a real part of the course to the student, not information *tacked on here and there*.

2. The *daily ten minute lecture* can be used with many techniques: lectures, textbook assignments, job sheets, assignment sheets, review sessions, tests, class discussions. The term *ten minute lecture* does not preclude other teaching techniques, rather, it conveys the idea of scheduled study daily.

3. Students quickly learn to expect a short lecture at the beginning of each class period, and they accept it as part of the course.

4. Students learn that pencil and paper are needed every day and that study is a part of every industrial-arts course.

5. The *ten minute lecture* settles the class down and they can begin their project work in an orderly fashion.

The outline of *daily ten-minute lectures* listed below was used for ninth grade bench metal and sheet metal, a nine weeks' course. Most of the lectures were given by the teacher; however, some were class discussions, some were short reading assignments, some were review sessions, and some were tests (the tests did exceed ten minutes in length however).

Careful planning allowed the related content to be presented just as the student needed it. For example: the lecture on "Heat Treating Metals" occurred just before the students casehardened hammer heads and of course the teacher's demonstration of the process related to the lecture on *heat treating metals*. In no case was the student left without information when he needed it.

These lectures relate to one specific course and represent one teacher's answer to the problem of teaching related content; therefore, the lecture outline should be read to grasp the principles of how the *daily ten minute lecture* method works and not be read with specific content in mind.

Ninth Grade
Bench Metal and Sheet Metal
Nine Week Course

Daily Ten Minute Lecture Topics

Week 1
Monday — Description of the course — plan of procedure for first project
Tuesday — Shop personnel system
Bill of material for first project
Wednesday — Safety in the shop
Thursday — Review tool identification
Friday — Review tool identification
(*Continued*)

Week 2
Monday — Safety with the drill press
Tuesday — History of iron
Wednesday — Iron ore, coke, limestone
Thursday — The blast furnace
Friday — The open hearth process of steel making

Week 3
Monday — The bessemer process of steel making
Tuesday — The electric furnace
Wednesday — Review the production of steel
Thursday — Test No. 1
Friday — Review test No. 1

Week 4
Monday — Plan of procedure for second project
Tuesday — Film "The Sheet Metal Worker"
Wednesday — Rolling steel
Thursday — Sheet and strip steel
Friday — No school

Week 5
Monday — Carbon content of steels
Tuesday — Alloy steels
Wednesday — Heat treatment of steel
Thursday — Heat treatment of steel
(*Continued*)
Friday — Tap and die

Week 6
Monday — Rivets
Tuesday — Twist drills (text assignment)
Wednesday — Twist drills (lecture)
Thursday — Review
Friday — Test No. 2

Week 7
Monday — Review test No. 2
Tuesday — Plan of procedure for third project
Wednesday — Sheet metal layout
Thursday — Sheet metal machines
Friday — Sizes and costs of sheet metal

Week 8
Monday — Soldering

(Continued on page 26A)

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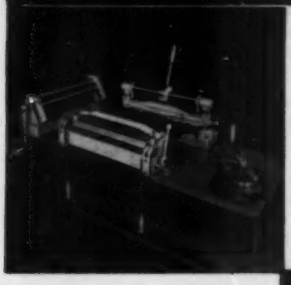

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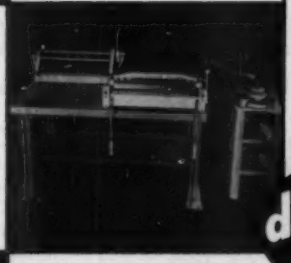

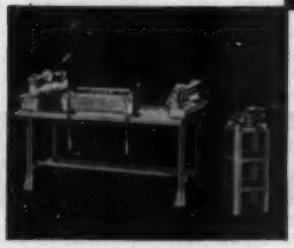

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RELATED CONTENT

(Continued from page 24A)

Tuesday — Soldering (*Continued*)
Wednesday — Introduce extra credit project
Thursday — Work day
Friday — Work day

Week 9

Monday — Review for final test
Tuesday — Final test
Wednesday — Review final test
Thursday — Shop clean-up
Friday — No school

SAFE PRACTICES IN WELDING

DR. W. SCHWEISHEIMER
Highland Hall
Rye, New York

A 50-year-old man had been a welder for six years, working mostly with steel. At times he worked with galvanized metal, which contains lead. His chief complaints were shortness of breath, of exertion, cough, expectoration, and constant sensation of oppression in his chest. The X-ray picture showed changes in both lungs. After he had done no welding for six months, another X-ray picture was made. Some of the changes noted earlier had disappeared.

This is a typical case described by Dr. Robert Charr of Philadelphia in his study on respiratory disorders among welders. The fumes of welding, particularly those arising from fluorides, cadmium, and chromium, are irritating to the mucosa of lungs and bronchi. The signs — one of which is a fever known as "metal-fume fever" disappear when exposure to the fumes is being avoided for a longer time. It is generally believed that these changes in the respiratory organs are not disabling.

Iron dusts are generally considered inert (inactive) when inhaled into the lungs. According to W. J. Carnahan, Philadelphia, in the 1950 U. S. census there were about 276,000 persons in the United States engaged in electric arc welding, almost 10,000 of whom were women. The incidence of serious siderosis in welders is low, but it does exist.

Extra Milk for Welders

In an industrial firm, the question of provision of milk to welders is frequently raised. Men engaged in this occupation regularly follow a practice of consuming extra quantities of milk. It is their firm belief that this counteracts the toxicity of the fumes to which they are exposed. A Montreal, Canada, physician asked the *Journal of the*

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American Medical Association whether there is any scientific evidence to support this belief.

The *Journal*, through its expert, replied that an extra intake of milk is commendable, but that the benefit is chiefly related to the ingestion of vitamins. The action of nitrogen oxides on lungs and bronchi is mostly local. Some welding work is attended by unusual thirst that is not easily satisfied. Some welders and galvanizers believe that milk best meets this need. Certainly milk consumption may not be relied on as constituting adequate protection against harmful concentration of either welding gases or metal fumes!

Welders' Disease in Belguim

The occupations of the men examined by the Belgian physician F. Mignolet were gas welding, oxy-gas cutting of metal, and arc welding. No acute illness from nitrous fumes was discovered. Some of the oxy-gas cutters and arc welders showed changes in the X-ray picture after 7 to 15 years' work. About 20 per cent of the arc welders were underweight as compared with 11 per cent of the workers used as controls. In the great majority of arc welders the blood pressure was below normal. Local exhaust draft is recommended.

Digestive (stomach) disturbances have sometimes been found. They were attributed in part to the crouching position assumed at work.

Stomach Troubles and Electrowelding

In Germany, Drs. F. Sommer and K. Reinhard studied the particular hazards through exposure to extremes of light and the inhalation of noxious gases and vapors produced by the high temperatures of welding. Personal clinical experience of the authors and the complaints of electrowelders suggested that digestive (stomach) orders were a particular hazard of electrowelding.

Accordingly, workmen in two factories employing 62 and 42 welders, respectively, were investigated with regard to stomach troubles. Questionnaires were filled out and they showed that in one factory 40 per cent and in the other factory 33 per cent of the electrowelders had digestive troubles. X-ray examination revealed that 10 per cent of all the welders had ulcers of the stomach or the duodenum (the first part of the intestines). In 39 per cent there was evidence of gastritis — a catarrh or inflammation of the stomach.

Sommer and Reinhard believe that these are effects which constitute a special hazard for electrowelders. They have the opinion that these digestive troubles may be due to manganese which becomes vaporized in the welding of manganese steel.

(Continued on next page)

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SAFE WELDING PRACTICES

(Continued from previous page)

Welding of Ferrous Metals

Another German observer, Dr. W. Hummitzsch, studied the gases and fumes in welding of ferrous metals. In oxyacetylene welding, normally carbon dioxide and water vapor are the combustion products, but sometimes nitrous gases can also occur from the nitrogen contained in small amounts in bottled oxygen. Under certain conditions they can attain 0.0025 volume per cent, which is already fatal after thirty to sixty minutes' breathing time.

In arc welding, harmful gases and fumes can originate from the constituents of the electrode coating, especially if they contain lime-basin materials (fluorspar) which may develop fluosilicate. The fumes developed from the metals are usually harmless, the grain size of the dust being very small for iron, cadmium, bare wires, and coated wires, etc. The susceptibility of welders to silicosis or other lining injuries was very low. It seems that the usual protective measures now in force are quite satisfactory.

Frequent Colds Among Welders

A. T. Doig and L. N. Duguid studied 240 welders in London, and their conclusion was that most of the welders had some irritation of the throat as well as the larynx (windpipe). The incidence of nasal catarrh and frequent colds was higher among welders than in the general population. Cough and discomfort in the chest were common. There were changes in the lungs, seen in the X-ray picture, when welders were long employed, particularly in those who had worked in confined places.

It was found, however, that on cessation of exposure to welding fumes these changes disappeared, which suggest that the iron particles were inert and easily removed by the white blood cells. Among these welders, the incidence of tuberculosis was not greater than would be expected in the general population. Doig and Duguid concluded that inhalation of welding fumes was not disabling, but could cause acute respiratory symptoms that disappear on cessation of exposure. This is particularly true for fumes containing iron-oxide particles. They also said that disability in some cases might not be due entirely to iron-oxide dusts but perhaps to inhalation of fumes arising from the coatings of the electrodes, which may contain harmful material.

Welders Using Argon and Helium Shielded Arcs

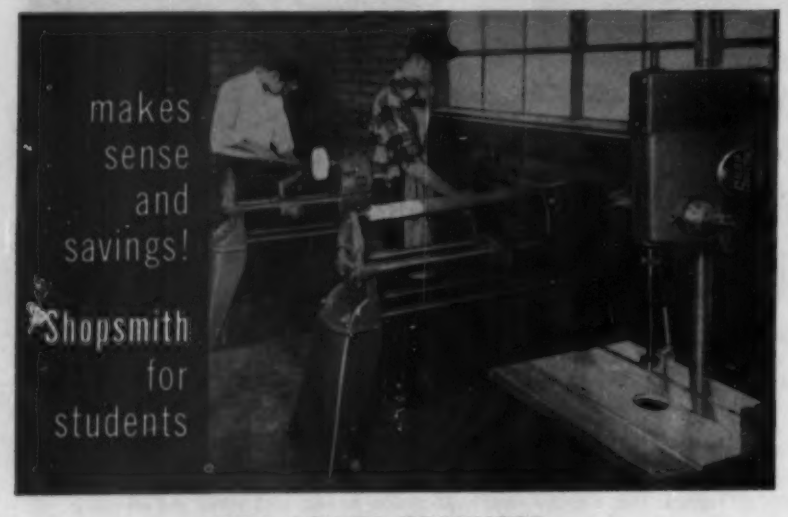
Drs. John J. Ferry and Gordon B. Ginther determined the concentration of ozone, nitrogen oxides, and phosgene in the breathing zone of welders using argon and helium shielded arcs. Oxides of nitrogen were not produced in significant concentrations during test studies. Ozone concentrations were within the irritating range but below the maximum allowable concentration of 1 ppm.

Trichloroethylene vapor from shop degreasing operations was decomposed, producing phosgene and other products. According to Ferry and Ginther, such decomposition may produce dangerous concentrations of phosgene from trichloroethylene concentrations well below odor threshold. Argon significantly increased the concentration of all gaseous products in the vicinity of the arc. Since the decomposition of trichloroethylene appeared to be photochemical, the authors are of the opinion that local exhaust ventilation alone would not prevent the formation of phosgene in the welders' breathing zone.

At What Distance Is Electric Arc Welding Harmful to a Bystander's Eyes?

Strange as it is, some everyday problems have not been solved with regard

(Continued on page 30A)



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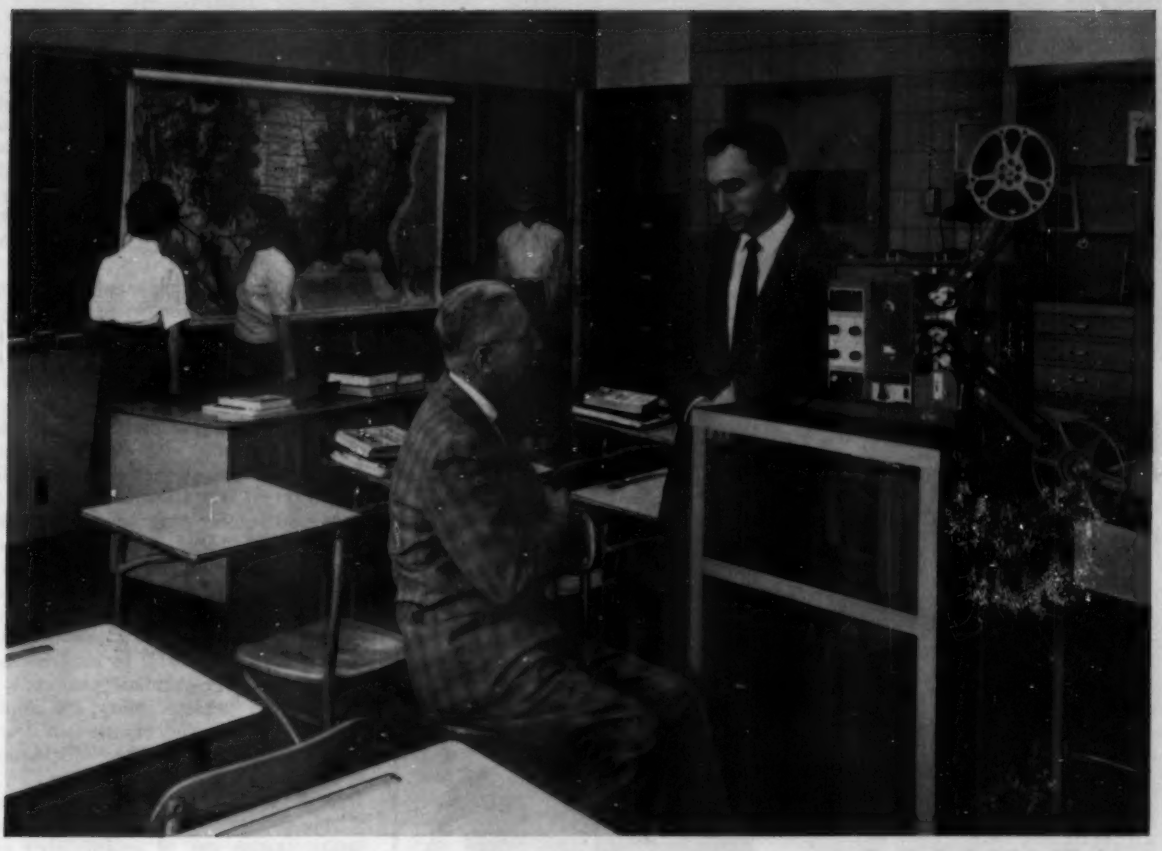

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SAFE WELDING PRACTICES

(Continued from previous page)

to health hazards of welders. The *Journal of the American Medical Association* recently had the problem: at what distance is electric arc welding harmful to a bystander's (not the operator's) eyes in broad daylight and under normal shop conditions?

The *Journal's* expert said that within any harmful distance, the duration of exposure to the electric arc may be of greater consideration than the distance itself. Not all ultraviolet emanations from arc welding are the same. The output increases with amperage and this varies enormously.

By some investigators, 200 ft. is accepted as a minimal distance for unprotected exposure for workers other than the operator or for bystanders. Regardless of the intensity of surrounding illumination, the output of ultraviolet light remains the same. On a bright, sunshiny day the ultraviolet rays of sunshine would be added to those from the arc, but this is of little consequence.

For practical purposes, the *Journal* points out, workers other than the operator at a distance greater than 50 feet are ordinarily adjudged not to need eye protection, even though the exposure is continuous. It should be kept in mind that the introduction of protective barriers does not necessarily assure safety for the eye, because reflected rays sometimes may cause injury.

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Not a light weight stripped-down or "utility" grade model solely for building boards, but a fine cabinet-shop planer with rugged 1-piece cast frame. Planes a veneer-like 1/16" on up to 4½" thick without tearing. No other planer, regardless of size or price planes smoother. Feeds automatically 6½" long and up without butting. Enough power for deep ¼" cuts on wide boards. Feeds up to 18 feet per minute. Self-aligned cutterhead and feed roll beam.
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JOINTERS
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Corresponding reductions on all other models. Oversize head and 4-foot 2-lock fence. Best for perfect joints and more footage with less skill. Planes 12" wide. (8" model has 84" tables, 66" long fence.) Wider infeed table makes rabbetting as easy and safe as jointing. Guard stays on machine — simply swings down. More accurate knife setting. Improved knife angle for beautiful blemish-free finish. Depth of cut ⅝".
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REMOVE THOSE STUMBLING BLOCKS

LOUIS J. ENOS
Lincoln Junior High School
Sacramento, Calif.

To increase the efficiency of a school shop it is necessary to remove obstacles which hinder it from functioning smoothly. The instructor, the physical setting, and the curriculum must be delicately geared and co-ordinated. *Stumbling blocks* in a shop program are like a few grains of sand in the works of a watch preventing it from performing as expected.

The most important part of any shop program is the instructor. Nearly everything hinges on his ability, personality, teaching technique, and educational philosophy. He is the heart and soul of the classroom. The succcess of a teacher depends upon satisfactory relationship with his students; therefore, he must develop and nourish such relations. Failure to do so is a *stumbling block*.

A shop teacher may have great ability, but the whole shop program becomes a failure if this ability is not applied. An industrial-arts instructor, for example, who can make beautiful cabinetwork for his own use may be completely unsuccessful in inspiring his pupils to make similar projects. A teacher may possess ability and application, but his students do not learn because he has a grouchy disposition and a general attitude of not having a true interest in a student's learning. Young people are quick to sense these faults. In one way or another they express their dissatisfaction with the instructor and all activities concerned with the course. This, however, is a normal reaction on their part. Shop students are not automatons; they are humans, usually high strung adolescents sensitive to everything about them. They can be discouraged and injured by conflicting personalities, fear, poor teaching methods, adverse environment, the inability to perform some task, or other reasons too numerous to mention. Their personalities do not develop in a vacuum, but as human beings engaged in experiences which have meaning, worth, and interest. An unfriendly, dis-

(Continued on page 32A)

Pittsburgh Color Dynamics®

plays a big part in improving efficiency and safety in industry

Modern vocational schools teach tomorrow's shopmen how to use this modern system of painting to create better working conditions.

Educators in industrial and vocational schools recognize that proper use of color is contributing to the improvement of production techniques and reducing the danger of time-loss accidents.

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● **All these benefits** from the use of COLOR DYNAMICS must be taught to the skilled shopmen of tomorrow. If you want your students to be thoroughly equipped for their future tasks, begin now to teach COLOR DYNAMICS in your training courses.

● **Better still,** provide practical demonstrations of the effectiveness of this painting method by applying it in the decoration of your classrooms and equipment.

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OVER 60 YEARS' EXPERIENCE IN SOLDER AND FLUX MANUFACTURING

REMOVE STUMBLING BLOCKS

(Continued from page 30A)

interested, or belligerent attitude on the part of the instructor can result in nothing but failure for his shop program. This eventually results in the students' avoiding elective courses offered by the teacher, and in turn causes the classes of other shop teachers in the school to become overloaded.

Anyone teaching young people must be able to develop and keep harmonious dealings with them. The shop instructor must understand his students and give them all the help he can. He should let each student know that he is an important part of the class. If a boy does something that is not quite right, the teacher should control his temper at all times. A person who *blows up* is likely to say things that will be regretted later. Using the *little fellows* as disciplinary examples very often gives a class the impression that the instructor is afraid of the big boys and therefore picks on the small ones. Teachers must have discipline but also see problems from the student's standpoint. A wise teacher acts in a manner he wishes his students to imitate. They see the instructor during class every day and naturally are going to do as he does regardless of being sent to the principal's office for misconduct or lectures on good behavior. In many cases of rudeness, for example, children unconsciously are repaying their teachers for some previous mistreatment accorded them. It is not at all unusual for an adolescent to carry in his mind a few bitter memories — the time that he was made the laughingstock of the whole class for something he considered seriously.

The physical setting of a classroom has much to do with a student's learning and behavior. The atmosphere created by the room itself can be one of interest and learning or drabness and boredom. Shops differ radically; they vary from very old to so new that the paint is not quite dry on the walls. An old shop does not necessarily need to look old or unattractive, and there is no excuse at all for a new shop to have a rundown appearance. It is not difficult to understand that sensitive adolescents are going to resent the idea of working in a place that is dimly lighted, filled with totally or partially broken-down tools and machinery, or having walls, furnishings, and equipment that are in need of a fresh coat of paint. A machine or tool in need of repair is not performing its instructional purpose. A shop which becomes a storeroom for the whole school is a warehouse, not a

(For more information from advertisers, use the postcard on page 57A)

classroom. Lost and misplaced tools cause students to stand idle. Acts of vandalism occur more frequently in a disorganized and shabby shop.

Shop orderliness, neatness, and cleanliness are of educational value. In a well-arranged shop the vandalism and pile-up problems vanish. Machinery, tools, and steel benches should be given a coating of paint or oil to prevent rust. Instead of covering a wood lathe, for example, with a drab unsightly piece of canvas year after year to minimize the effects of a leaky roof, the machine could be moved to another spot and kept well oiled until the roof is repaired. Old benches with wooden tops can be repaired and refinished. Machinery and tools need to be inspected to prevent accidents and breakdowns. It is to a teacher's advantage to consider the possibilities of color. Proper utilization of color can work a minor miracle in any school shop. It will change an ugly, marred metalworking vise into a new appearing device that the students want to use and care for. It can make a shop look larger or change its apparent proportions. It can make a dark room seem sunnier. Use soft or clear shades lavishly on large areas, and intense or highly dramatic colors for smaller accents. It may take a little time and work to renovate and rearrange the physical setting of a shop, but the rewards will be worth the effort. By keeping the shop and equipment attractive and in good working order an environment conducive to best work efforts and deportment is created. Crannies that have been overlooked by the janitor's brush, broom, or dust rag must not be overlooked by the teacher. Paint, oil, or varnish that has been spilled upon the floor has to be carefully cleaned up. Temperature and ventilation are not always easy to control, but students resent being in a shop with all the windows closed. Care should be taken to insure the most desirable working conditions. Lighting is of great importance. Students must be able to see well to do good work. If the lighting is not satisfactory, a few gooseneck lamps can be placed where students can use them for intricate work. Psychologically it causes a boy to feel like a master craftsman when working under a special light of his own.

A good curriculum is important in every shop. Excellent courses of study and related curricular material are provided in every school system, but all these things must be adjusted to fit the ever changing needs of the whole class and the individual student. At times it is necessary to turn away from the established course of study to take care of unforeseen problems. Let us take, for instance, a woodwork teacher who

(Continued on next page)

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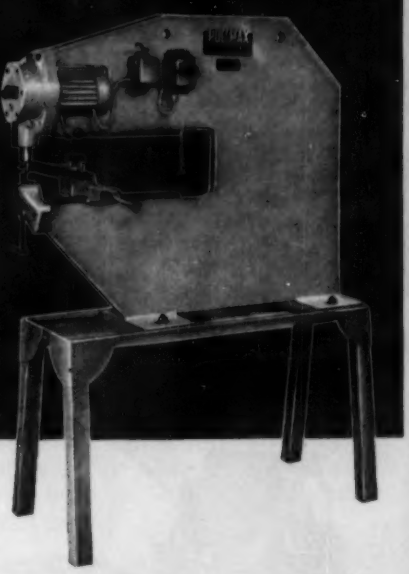

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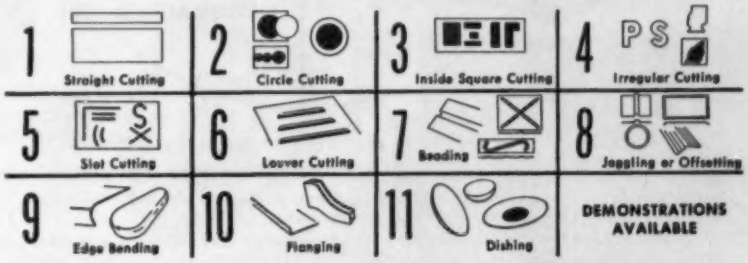

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REMOVE STUMBLING BLOCKS

has never changed his projects for the beginning students. A boy enters the class as his three brothers have before him. Each one made a broom holder, a little wooden box, a breadboard, and a name plate. This means that their home has become loaded with three broom holders, three little wooden boxes, three breadboards, and three name plates. Now it is his turn to be subjected to the same projects. Psychologically nobody could blame him for having a rebellious attitude. A teacher needs to realize that there are more ways than one to teach a specific technique. Projects can be changed from time to time, and the alert instructor is always on the lookout for new ones. He should never be reluctant to set aside the old for the new. It is a waste of time to try to force a slow learner or mentally retarded child to perform a task beyond his intellectual ability even though it is written in the course of study. If it is required that a pupil make a detailed drawing of a project before starting construction, such a student may find this an insurmountable *stumbling block*. Rather than let the child sit and be a failure all semester, allow him to help figure a method of procedure suited to his interest and ability. This child will get such a thrill from his own accomplishments that he will be inclined to grow impatient of help and want to do things for himself. How much better this is than letting him flounder and become discouraged! It is up to the shop instructor to create situations which will invite desired reactions. This is quite significant, for students look upon the teacher as a sort of assistant or helper in their struggle to adjust. The important thing is to use the course of study as a pattern and not a finished product. A flexible curriculum is a necessity for best teaching and learning. A fixed curriculum can become an obstacle instead of an aid.

Removing the stumbling blocks in any shop will solve many problems and make teaching and learning easier. Let every industrial-arts instructor make a periodic inventory of the hindrances to good teaching and learning in his shop and eliminate them as soon as possible.

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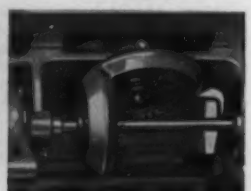
This illustration shows the adjustable bed tracks, the extension roller tracks and the impression counter with bracket.

This illustration shows the belt guard, the motor and expandable pulley.



Silent ink disc drive on all three sizes. Illustration above as installed on 10 x 15 and 12 x 18.

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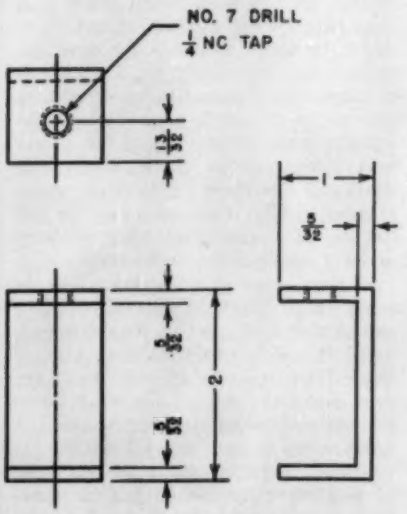
Tri square, metal bluing, scriber, hack saw, file, center punch, drill press, No. 12

(Continued on page 36A)



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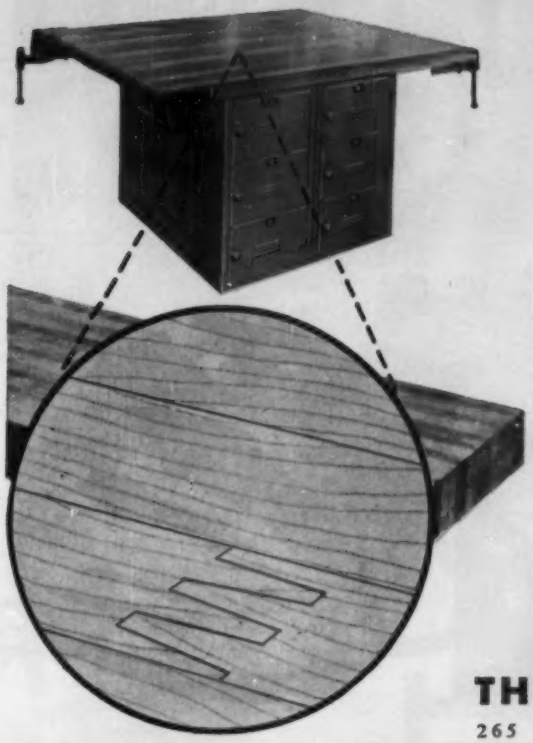

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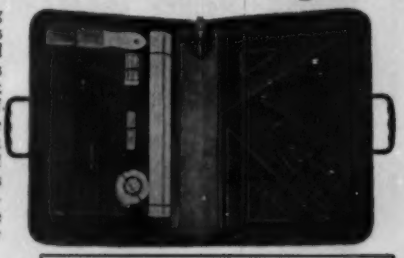

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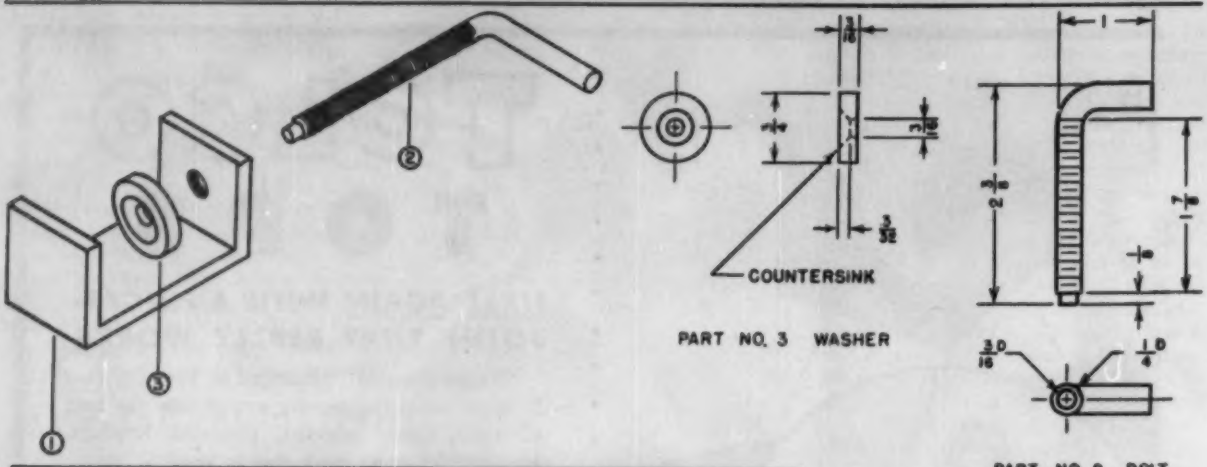

Details of homemade C clamps

HOMEMADE C CLAMP

(Continued from page 34A)

and No. 7 twist drills, ¼ N.C. tap and die, metal vise, ball-peen hammer, and countersink. A welder is used if the frame is constructed from two pieces of angle iron.

A homemade C clamp

Procedure

1. Lay out frame on channel iron or two pieces of angle iron welded together.
2. Cut out frame.
3. Lay out bolt hole in frame, drill, and tap.
4. Cut bolt to length, turn to dimensions shown, and cut threads.
5. Bend bolt.
6. Cut washer from mild steel plate or shaft.
7. Drill hole and countersink in washer.
8. Assemble bolt in frame and peen washer on bolt.

Bill of Materials

No.	*Part*	*Material*	*Size*
1	Frame	Channel iron or angle iron	2 by $\frac{3}{32}$ in.
2	Bolt	Mild steel bolt or rod	¼ by $3\frac{3}{8}$ in.
3	Washer	Mild steel plate or shaft	¾ by $\frac{3}{16}$ in.

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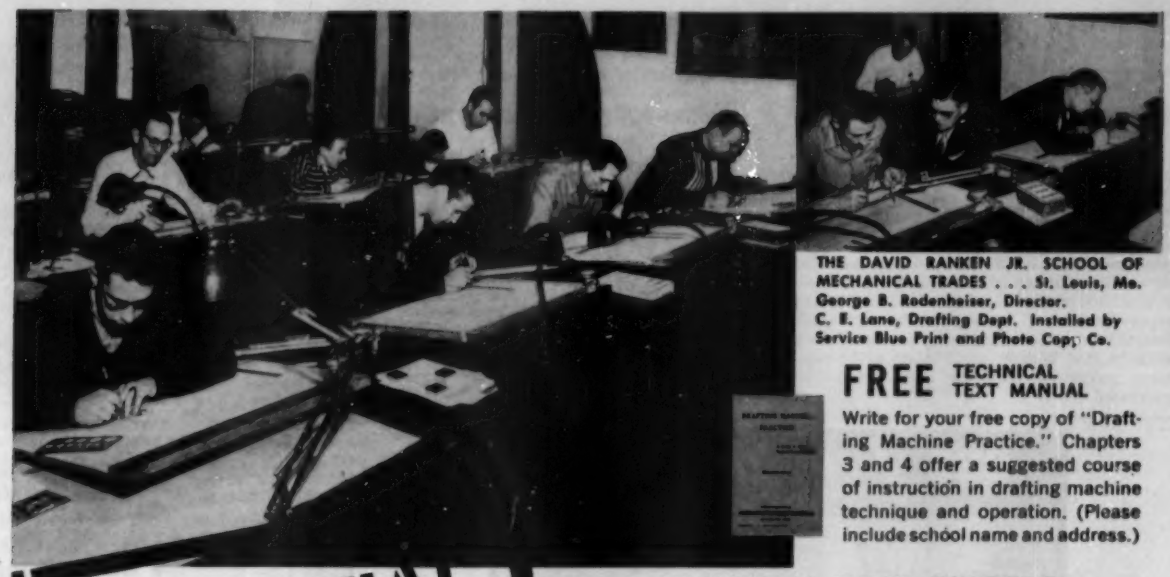

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NEWS NOTES

(Continued from page 17A)

lished by the National Audio-Visual Association.

The Directory lists some 452 NAVA dealers by geographical location, so the audio-visual user can locate a dealer in any area. Each dealer listing is coded to show where the user can find each of 15 types of audio-visual equipment for rental, and which dealers offer projection service, projection room facilities, or audio-visual equipment repairs. The code also shows which ones offer films of various types — sponsored, educational, informational, entertainment, and religious; the size of each dealer's film library, and where a-v equipment, accessories, films, and filmstrips can be purchased.

Single copies of the Membership List and Trade Directory are available free of charge to audio-visual users from the *National Audio-Visual Association, Box 337, Fairfax, Va.*

LABORATORY-DEMONSTRATION WORKSHOP

The 1959 Annual Laboratory-Demonstration Workshop will be held at The Betts Reading Clinic, Haverford, Pa., July 20 to July 31, inclusive. The activities, developed around *Foundations of Reading Instruction*, will be conducted by Dr. Emmett A. Betts and Miss Carolyn M. Welch.

Delegates usually are sent by boards of education. Since workshop activities require pupils for the demonstrations and the laboratory experiments, advanced registration is required.

The Betts Reading Clinic, Haverford, Pa.

A NEW SCIENCE FILM

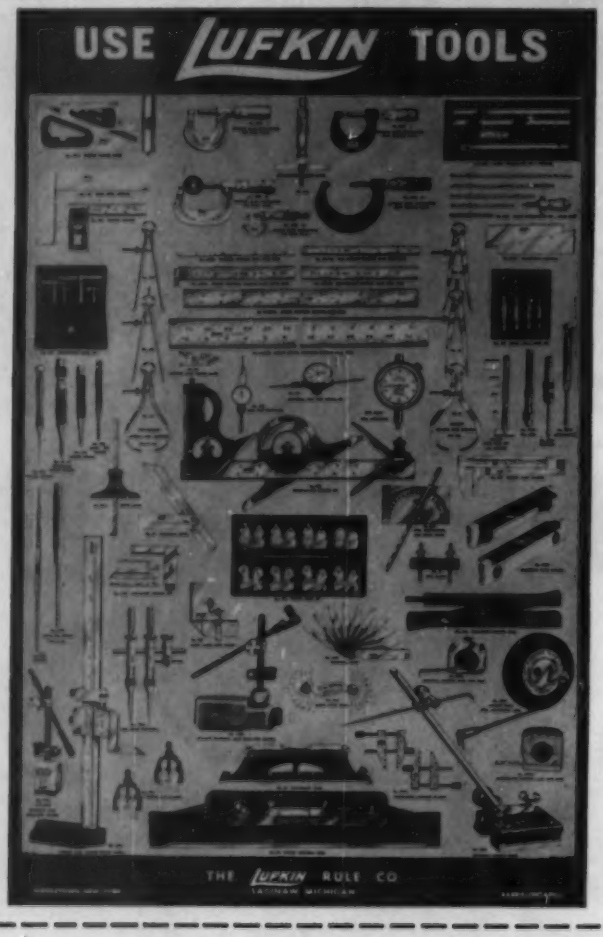
"Time," a new science film for classroom use, has been released by the Audio-Visual Center of Indiana University.

Through live photography, models and animation, the film portrays scientific time determination, timekeeping, standard time zones in the United States, Daylight Saving Time, Greenwich Time, and the International Date Line.

Teachers of science, mathematics, and geography in grades five through nine will find the film useful in teaching units concerned with time. It can also be used in high school and college beginning astronomy courses.

The film runs 15 minutes in length, sound, and is available for purchase in color or black and white from *Audio-Visual Center, Indiana University, Bloomington, Ind.*, and from the *Educational Film Library Association, 250 West 57th St., New York 19, N. Y.*

On October 8, 1918, Sgt. Alvin C. York, practically unassisted, captured 132 Germans in Argonne Forest, after his patrol had been cut off by German forces outnumbering them more than 10 to 1. — *Wisconsin Military District.*



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New Publications

Course Making in Industrial Education

By John F. Friese. Cloth, 299 pp., 6⅛ by 9¼ in., illus., $4. Chas. A. Bennett Co., Peoria, Ill.

This is a revision of a book that has appeared in mimeographed form since 1931.

In 1939 it appeared in printed form, and the present revised form is to bring it up-to-date in both industrial arts and vocational education.

The 20 chapters discuss the problem, its importance, and guideposts; steps in course construction; scope and formats of comprehensive courses of study; historic trends of industrial course materials; philosophy of industrial arts and vocational industrial education; procedure in establishing the aims of industrial education; aims of industrial departments and courses; analyses as procedural techniques; related content in courses of study; teaching methods in courses of study; class organization and shop management; correlation in courses of study; interrelationships of aims, content, methods, and management; curriculums in industrial education; general drafting, sketching, and graphic reading; factory maintenance and repair; general industrial arts; pre-employment course in engine lathe practice; and beginning related mathematics.

Dictionary of Astronomy and Astronautics

By Armand Spitz and Frank Gaynor. Cloth, 439 pp., 6 by 8½ in., illus., $6. Philosophical Library, Inc., New York, N. Y.

This dictionary will be useful to students who are studying astronomy. It contains over 2200 terms and concepts used in astronomy and astronautics — terms ranging from those as old as man to those as new as the present space age.

The book also contains some illustrations.

Electronics for Everyone

By Monroe Upton. Cloth, 386 pp., 5¾ by 8⅝ in., illus., $6.95. Devin-Adair Co., New York, N. Y.

(For more information from advertisers, use the postcard on page 57A)

This book was first published in 1954. The present volume represents the fourth printing and second revised edition. Because the revisions have brought much new and important material to the book, it is practically a new book.

It is an excellent book for the layman who desires to have a basic understanding of electronics as it is known and used today.

Technical students will find this book different from the usual text, and what is more, they will enjoy the author's humor.

Fundamentals of High Fidelity

By Herman Burstein. Paper cover, 136 pp., 5½ by 8½ in., illus., $2.95. John F. Rider Publisher, Inc., New York, N. Y.

How to select the best hi-fi equipment for the money you have to spend, and how to achieve the best performance and realize the most pleasure from your equipment are the purposes of this book. The emphasis is not so much on what an amplifier is, rather than on what an amplifier (and the rest of your high fidelity system) should provide, and how you can choose the best equipment to fit your pocketbook. The book also deals with aspects of high fidelity and with technical terms with which the hi-fi enthusiast must be familiar.

Mechanical Design and Analysis

By R. R. Slaymaker. Cloth, 418 pp., 6 by 9¼ in., illus., $9.50 Trade Edition, $8.00 College Edition. John Wiley & Sons, Inc., New York, N. Y.

This is an excellent engineering textbook which acquaints the student with general and specific projects. The machine elements discussed embrace antifriction bearings; belts; bevel gears; bolts; columns; helical gears; helical springs; involute spur gears; keys, splines, cotters, and pins; leaf springs; planetary gear trains; rubber bushings; shafts; sleeve bearings; wire rope, and worm gears.

The author has inserted problems that actually needed to be solved, thus giving to this text a realistic approach to design with actual industrial case studies.

Mechanics: Part II, Dynamics

By J. L. Meriam. Cloth, 420 pp., 6⅛ by 9¼ in., illus., $5. John Wiley & Sons, New York, N. Y.

This is the second edition of this very fine engineering book. It is excellently illustrated and very well written.

The contents describe the principles of dynamics; kinematics; principles of kinetics; force, mass, and acceleration; work and energy; impulse and momentum; and periodic motion.

Appendix A presents review problems; appendix B, vector methods; appendix C, moments of inertia (of areas and mass); appendix D, useful tables.

The book presents more than 750 practical problems.

Building the Amateur Radio Station

By Julius Berens, W2PIK. Paper cover, 136 pp., 5½ by 8½ in., illus., $2.95. John F. Rider Publisher, Inc., New York, N. Y.

Anyone who intends to buy the equipment for an amateur radio station, or build one, will find this volume indispensable. This book is the next step for the amateur radio enthusiast who has earned his operating license. In his sequel to "Getting Started in Amateur Radio," the author, W2PIK, has written an excellent guide for construction of a novice or general ham station. Every tool and its use is mentioned. Chassis layouts are provided and text instructions are reinforced with diagrams and illustrations. Also includes instructions for receiver and transmitter on-the-air operation.

Design Manual for Cabinet Furniture

Published on behalf of the Furniture Development Council by Pergamon Press, Inc., New York, N. Y. Cloth, 49 pp., 6⅛ by 9¼ in., illus., $3.50.

This helpful little book lays down the basic principles that can be applied when designing cabinet structures.

The simple facts about cabinet rigidity are discussed in Chapter I. Chapter II explains how cabinet rigidity can be measured and shows how twisting forces and diagonal forces can be applied to the cabinet structure when measuring its rigidity.

Chapter III shows how the principles that have been laid down can be applied in the construction of an actual piece of furpiture, and Chapter IV shows how mathematics is applied to calculate the size of members that are to furnish the stiffness.

The Book of the Lathe

By C. T. Bower. Cloth, 192 pp., 5⅛ by 8½ in., illus., $3.50. The Macmillan Co., New York, N. Y.

This book was first published in 1955 and then reprinted in 1957. Its author is a tool engineer and a technical writer who has had a lot of experience in the operation and care of a lathe.

This book contains 50 half-tone cuts and approximately 120 line cuts.

Its 14 chapters give the reader an introduction to the lathe, describe how to choose a lathe, how to care for it, and make the needed adjustments. It also explains how to do straight turning, face-plate work, use mandrels and collets, do taper turning, drilling, boring, reaming, screw cutting, and cutting tool principles.

(Continued on next page)

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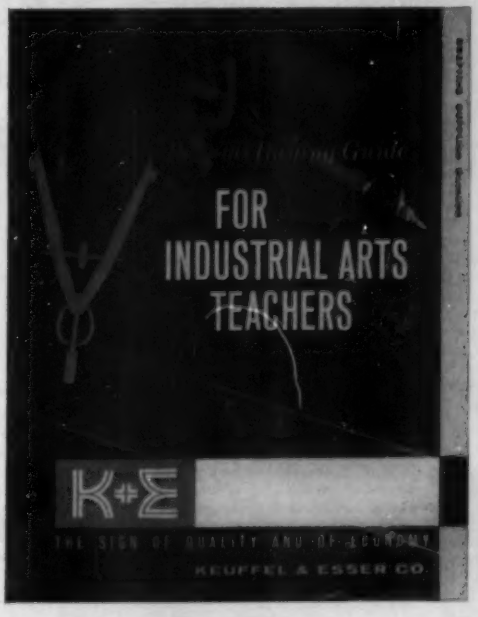

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NEW PUBLICATIONS

(Continued from previous page)

Conductance Design of Active Circuits

By Keats A. Pullen, Jr. Cloth, 344 pp., 6 by 9 in., illus., $9.95. John F. Rider Publisher, Inc., New York, N. Y.

The non-linearity of electron tubes and transistors has for many years greatly complicated the design of active circuits associated with these devices. This book presents a proved method of overcoming these complications. The conductance approach utilizes a technique whereby a non-linear circuit may be linearized on a point-by-point basis.

This definitive book explains and illustrates the theory and mathematics involved in this technique. It presents the conductance technique as applied to the design of a wide variety of vacuum tube and transistor amplifier, mixer, and oscillator circuitry in the broadest sense. To make the mathematics completely understandable, practical numerical examples are given throughout.

This book merits serious study by electronic circuit design engineers as well as those who teach engineering in universities and colleges.

Fundamentals of Nuclear Energy and Power Reactors

By Henry Jacobwitz. Paper cover, 118 pp., 6 by 9 in., illus., $2.95. John F. Rider Publisher, Inc., New York, N. Y.

This exciting book, with its remarkably understandable illustrations, supported by up-to-the-minute crystal clear text, makes it possible for anyone to comprehend the fast-moving developments in this expanding field. After lucidly presenting the fundamental concepts in atomic and nuclear physics essential to understanding the operation of nuclear reactors, the book discusses the construction, principles of operation, cost and power output of specific plants.

Experimental reactors and the forerunners of the units now under construction are covered. Numerous pictures and carefully selected illustrations make the theoretical material understandable and show what the various installations actually look like. It is a very well-balanced book which should be of great value to not only the personnel of power utilities, but to all students of physics as well as the technically minded public who are desirous of learning the details of this new technology.

Electrical Engineering — Theory and Practice

By William H. Erickson and Nelson H. Bryant. Cloth, 613 pp., 6 by 9¼ in., illus., $8. John Wiley & Sons, Inc., New York, N. Y.

This is the second edition of this book. It is an excellent engineering text that is clearly written and well illustrated. Considerable material on transistors has been added to this new edition, and the number of problems at the end of each chapter has been increased.

The 29 chapters treat the subject matter under the following titles: introductory concepts, resistance, electric circuit laws and d-c circuits, magnetics and magnetic circuits, electromagnetic induction, inductance and capacitance, alternating currents, single-phase a-c circuits, polyphase a-c circuits, electrical instruments and measurements, the d-c machine, d-c generators, d-c motors, d-c motor control, transformers, the three-phase induction motor, three-phase synchronous machines, single-phase motors, control equipment, high-vacuum tubes, gas-discharge tubes, semiconductor devices, single-phase rectifiers, power rectifiers, electronic amplifiers, analysis of linear electronic circuits, elecronics in communications, electronic control, and miscellaneous electronic circuits.

Our Yankee Heritage

By Carleton Beals. Cloth, 400 pp. The manufacturers Association of New Haven County, Inc., New Haven 1, Conn.

This is a new and revised edition of a book first issued in 1951, and tells the history of the New Haven area in terms of the Commerce and industry of the area.

Fundamentals of Radio Telemetry

By Marvin Tepper. Paper cover, 116 pp., 6 by 9 in., illus., $2.95. John F. Rider Publisher, Inc., New York, N. Y.

Telemetry is closely related to missile and aircraft development for the exploration of outer space, because it makes possible the collection of data on which the improvement of existing rockets, missiles, and aircraft is based. This exciting book covers the field of radio telemetry, explains its purpose and explores its techniques. Special sections are devoted to missile and satellite telemetry and hardware, and to data recording and processing. Specially prepared and carefully selected illustrations make important telemetry fundamentals crystal clear.

Video Amplifiers (Electronic Technology Series)

By Alexander A. Schure, Ph.D., Ed.D. Paper cover, 88 pp., 5½ by 8½ in., illus., $1.80. John F. Rider Publisher, Inc., New York, N. Y.

This book provides a thorough understanding of the design and application of video amplifiers. It shows how design problems are solved. It utilizes examples that are easily applied to radar, television, and pulse amplification where many video amplifiers are used.

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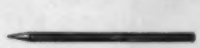

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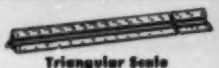

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Shop Equipment News

KNIGHT-KIT "12-IN-1" ELECTRONIC LAB KIT

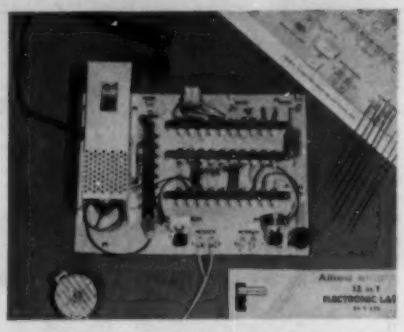
Allied Radio Corporation announces the release of the Knight-Kit "12-in-1" Electronic Lab Kit. This new training kit is easy to assemble, and offers many features that make it excellent for classroom use and other group instruction. It includes a low-voltage 12K5 tube, microphone, wire, and all parts for building any one of 12 interesting and practical circuits that clearly demonstrate basic electronic principles.

Its easy-to-change circuits include: audio amplifier; AM radio; wireless broadcaster; wireless code practice oscillator; photoelectric relay; audio oscillator; code "transmitter"; electronic timer; voice-operated relay; electronic switch; electronic flasher; capacity- operated relay; and light-controlled oscillator.

An easy-to-understand instruction manual, including pictorial diagrams, tells students exactly how to proceed with initial wiring and how to change circuits. Operational theory is simply and clearly explained and the manual is suitable for either youngsters or adults.

The "12-in-1" is "safety-ized" for absolutely safe operation — no voltages on the kit board exceed 25 volts and its transformer type power supply is enclosed in a shield. A unique feature is that students can quickly change from one circuit to another without any need for unsoldering the actual components — the experimenter simply moves jumper wires to different points on the terminal strips.

Stock number of the Knight-Kit "12-in-1" Lab Kit is 83 Y 272.



Knight-Kit "12-in-1" Electronic Lab Kit

(For further details encircle index code 0501)

TWO NEW PORTABLE ELECTRIC DRILLS

The Black & Decker Mfg. Company, through its Industrial-Automotive Division, has announced two new additions to its line of portable electric drills.

First, a completely new ½-in. Special Drill (Cat. No. 679) with a 62 per cent power-increase over previous models, has been introduced. Driven by a Black & Decker Drill Motor, the unit is ideal for extra caliber drilling in machinery, rigging, construction, and repair work. It drills diameters up to ½ in., in steel, ¾ in., in masonry, 1 in., in hardwood, and drives hole saws up to 2 in. Weighing only 7½ lb., the unit is compact and close-coupled for maximum efficiency; while a sturdy die-cast housing and standard-equipment spade and pipe handles provide built-in ruggedness for years of dependable service. Other features include a geared chuck and key, 3-conductor cable and rubber key-holder, and "instant-release" trigger switch.

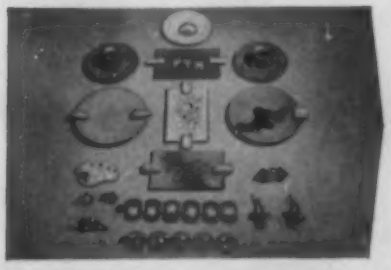
Black & Decker ½-in. Special Drill

The company also has introduced an all-new, low cost ¼-in. Drill (Cat. No. 680), for use in light automotive work, service trades, farm repair jobs, etc. It weighs 3 lbs., has a

(Continued on page 44A)

Now...a new, easy method for COPPER ENAMELING

The PREST-O-LITE Air-Acetylene Torch, which supplies a flame temperature of 4,000 deg. F., is the ideal tool for enameled copper projects. In using a PREST-O-LITE Torch, students:



1. learn a new valuable skill in torch handling.
2. SEE the enameling process as it takes place.
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SHOP EQUIPMENT NEWS

(Continued from page 42A)

drilling capacity up to ¼-in. dia., in steel, and ½ in. dia. in hardwood. It is capable of driving hole saws up to 1⅛ in. dia., in any material a hack saw will cut.

(For further details encircle index code 0502)

FORD NEW INDUSTRIAL POWER UNITS

Introduction of four new Ford industrial power units, which now gives the Ford industrial engine line a full complement of power unit combinations for its diesel and gasoline industrial engines, was announced recently by Ford Division's Industrial Engine Department.

The Ford power units include the most modern industrial engines fully adapted with sheet metal housing and instrument panel, electrical system, radiator assembly, skid-type mounting and other components which make the unit ready for its industrial job.

The new power units are built around Ford's 330 cubic inch six-cylinder diesel engine and the three new Super Duty gasoline engines of 401, 477, and 534 cubic inch displacement. Ford already offers power units for its other diesel and gasoline-powered industrial engines, beginning with the 134 cubic inch engine.

The compactness, durability, and ready parts and service availability have made the Ford industrial engines popular with many types of industry. All Ford industrial power units are available with special attachments — transmissions, torque converters, and SAE housings — which permit customized installation in most cases.

The Ford industrial engines and power unit line, marketed through the Ford Division Industrial Engine Department and Industrial Products Dealers from coast to coast, now includes the "220" and "330" diesels, two four-cylinder, one six-cylinder, and five V-8 gasoline engines, and power units for each engine.

(For further details encircle index code 0503)

NEW ALL PURPOSE ELECTRIC ERASING MACHINE

Charles Bruning Co., Inc., have announced a new hollow shaft electric erasing machine, which features careful engineering for added erasing comfort and greater operating efficiency. Known as Bruning Electric Eraser Model 3831, the machine is designed for use in both office and drafting work.

The unit is set in operation at 3100 r.p.m., by a slight index-finger pressure on a sensitive switch. A nonslip gripping surface on the

Bruning Electric Eraser Model 3831

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attractive lightweight, well-balanced aluminum case with attractive baked enamel finish permits convenient handling. The case, tapered for pencil-like manipulation, is symmetrically contoured and has no sharp edges. The unit makes erasures in a fraction of time required for manual erasing.

Long lasting seven-inch erasers are firmly gripped in place by a chuck, and chuck ring to prevent eraser wobble or paper damaging "flyouts." Above the chuck, the entire eraser length is contained in the hollow core of the shaft.

The same unit can be used for pointing draftsmen's refillable pencils by means of a pencil pointer attachment that fits into the hollow shaft on the back end of the machine. Thus, the pointer can be installed without disturbing the opposite end of the machine, where the eraser is held. The attachment does not interfere with hanging of the machine for storage.

Write for additional information on Bruning Electric Eraser Model 3831.

(For further details encircle index code 0504)

DELTA RADIAL SAWS WITH "MICRO-SET" MITER STOPS

Rockwell Manufacturing Company's Delta Power Tool Division have introduced the new "Micro-Set" miter stops to solve the problem of a radial saw's miter locating device from getting out of alignment. The miter stops are now included, as standard equipment, on all Delta radial saws: 16—20 in., 12—14 in., 10 in., and Super 900 9 in.

A simple adjustment of the three stop positions makes it possible to produce accurate miter cuts and perfectly square cross cuts at all times. Perfect 90-deg., and 45-deg. settings are assured for the life of the saw.

The "Micro-Set" miter stops involve an exclusive construction principle which permits each locating notch to be individually adjusted should the need arise. With the adjustable stops, heavy jolts which might disturb the alignment of permanently "set" miter stops are no longer a problem.

Further information available.

(For further details encircle index code 0505)

NEW STACOR-UNIC DRAFTING TABLE

Stacor Equipment Company have announced a new drafting table for architects, artists, and engineers that literally floats into any position, and holds without wobbling.

The Stacor "Unic" adjustable drafting table is balanced perfectly in any position by a counterweight mechanism, operated by foot pedals. Its large range of movement permits the draftsman to work comfortably on any

New Stacor-Unic Drafting Table

(Continued on next page)

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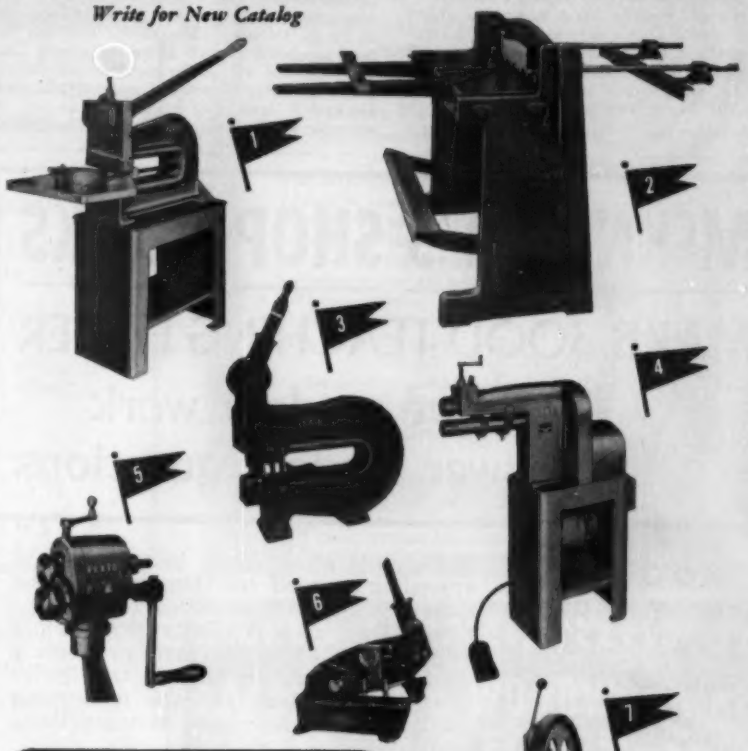

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(For more information from advertisers, use the postcard on page 57A)

SHOP EQUIPMENT NEWS

(Continued from previous page)

part of the board, standing up or sitting down.

A multi-disk friction device locks and unlocks the board to make height and slope simultaneously adjustable, while heavy gauge, electrically welded frame and parts assure absolute rigidity in any desired position.

Finish and construction details of the Stacor "Unic" drafting table are top quality, in keeping with the board's revolutionary design. It is available in four board sizes: 40 by 60 in., 34 by 47 in., 26 by 36 in., and 27½ by 40 in., from the Stacor Company.

(For further details encircle index code 0506)

WEBER TRIPOD-EASEL WITH SKETCH BOX

F. Weber Co., Inc., have introduced their new Weber Tripod-Easel featuring unexcelled rigidity, compactness, and ease of assembly. The use of special, strong, lightweight woods provides sturdiness of construction with light carrying weight.

The complete unit consists of an adjustable tripod and a detachable 12 by 16-in. artist's sketch box and palette, the box equipped with canvas-holding attachments which adjust to accommodate canvases and canvas boards up to 30 in. in height. The sketch box may be used separately as well as on the tripod. The unit is ideal for either outdoor or indoor painting. A ring is provided under tripod head for ease in suspending a weight, if needed, in extreme wind conditions. Over-all weight of Tripod-Easel with Sketch Box is approximately 12 lb.

Specifications

Tripod: Made of imported white wood, a variety of white mahogany, light in weight, strong in texture. Each leg independently adjustable by means of sliding joints for any height from 30 in. to 50 in., from ground to top of easel, for either standing or sitting while painting. Sturdy legs, slotted at the top for adjusting the lower leg joint. Seven-inch diameter tripod head. Strong hardware, chain brace, and web carrying strap. Tripod closes into handy carrying dimensions.

Sketch box: Equipped with palette, made of finely finished hard wood, similar to Weber Cape Cod Box No. 12, measures 12 by 16 in. Metal reinforced bearing hole in floor of box for easy attachment to tripod by means of a single wing nut. Lid of box adjustable for angle of tilt by means of a stay hinge. Canvas-holding apparatus attached to lid will accommodate stretched canvases or canvas boards up to 30 in. in height. Strong hardware includes brass luggage catches and plastic carrying handle.

(For further details encircle index code 0507)

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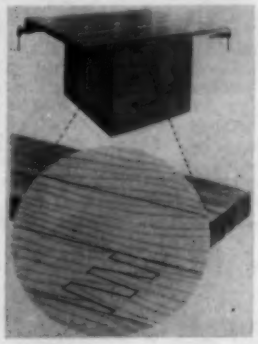
STRONGER METHOD FOR JOINTING MAPLE STRIPS

"Finger-Jointing," the name given to a perfected method of economically and effectively jointing the best end strips (white or sap cuts) of maple logs, has been announced by The Tolerton Company.



Jointing Maple Strips

"Finger-Jointed" maple strips, used for laminating bench tops, are actually stronger than a solid lumber strip since all imperfections can be graded out of the finished piece. By the use of "Finger-Jointing," Tolerton end products (laminated Northern hard maple bench tops, laboratory tops, cutting boards, etc.) offer greater tensile strength, harder wearing surface, and uniformly white color.

Tests show this newest method of end strip-jointing offers greater strength and durability than butt-jointing or other methods now in use.

Further information available.

(For further details encircle index code 0508)

SAXCRAFTS NEW BRAYER

Saxcrafts (Division of Sax Bros., Inc.), manufacturers and distributors of art and craft supplies, have announced the availability of their new custom-made Brayer, of particularly sturdy construction. The new Sax Brayer is designed to take hard use, and yet give perfect impressions over a long period of time.

(Continued on page 48A)

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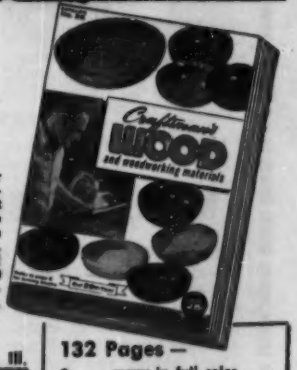

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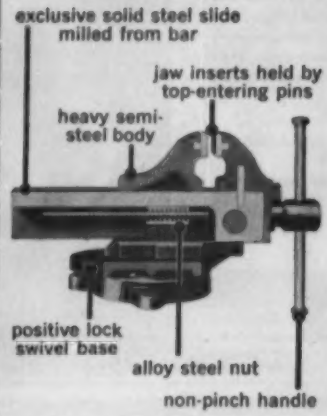
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SHOP EQUIPMENT NEWS

(Continued from page 46A)

Saxcrafts New Brayer

The Sax Brayer comes in two sizes: with 5-in. roller for all-purpose use, and 2-in. roller for running narrow patterns or multi-color printing. Not only is the frame sufficiently strong to take continuous hard wear, but the pins which hold the roller in place are designed so that they will not loosen and fall out. The roller itself is made of soft rubber, that is, 3/16-in. thick. It is impervious to changes of weather, as well as to oil or water. It has been tested under all conditions, and was found to hold up perfectly under the most rigorous tests.

Further details may be obtained by writing.

(For further details encircle index code 0509)

ALVIN DRAWING PENCILS

Alvin & Company, Inc., now offers a new line of "Paramount" drawing pencils. Scientifically manufactured under rigid standards, these pencils are highly dependable for clear, clean results both in classroom and commercial use.

Alvin Drawing Pencils

Paramount "Diamond" Drawing Pencils are made from the finest cedarwood, with opaque leads available in 18 degrees, perfectly graded to permit constant uniform density. They are extra strong to withstand extreme pressure, smooth, noncrumbling, longer wearing, and sharpen to a fine, clean point. Degree of hardness is distinctly marked on three sides for easy identification. Chrome cap with bright blue finish.

Paramount "Star" Drawing Pencils are made of quality cedarwood and exceptionally fine leads in ten degrees of hardness. Degree of hardness is distinctly marked on two sides for quick identification.

Paramount "Chrome" Drawing Pencils, made of quality cedarwood, have distinctive gilt-metal tip, excel in brilliance and strength, and are of smooth, uniform texture. They can be sharpened to blunt or fine points and are excellent for drawing, sketching, marking, and checking. The "Chromo" is available in a range of twelve attractive colors that will not smear.

For further information, write to Alvin & Company, Inc.

(For further details encircle index code 0510)

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(For more information from advertisers, use the postcard on page 57A)

NEW HAND OPERATED SHEAR

O'Neil-Irwin Mfg. Company, makers of Di-Acro Precision Metalworking Machines, have introduced a new hand operated 36-in. Shear with inclined ram said to have a combination eccentric-leverage operation that provides much greater mechanical advantage than is possible with a shear operated by leverage only.

Spartan Model 36 Di-Acro Shear

Called Spartan Model 36 Di-Acro Shear, the inclined ram feature of this machine enables shear blades to be set at an angle so that only the blade edge is in contact with the material thus reducing shearing force or pressure. Material as heavy as 16-gauge mild steel can be cut across the 36-in. width.

The inclined ram approach also helps to counteract thrust and keep shear blades straight, ram eccentrics are mounted back from centerline to hold the ram against ram guides. A downward and backward pull keeps ram housing against the guides and allows an accurate close blade clearance with resultant die accuracy in shearing.

Built to shear most types of sheet material, the Spartan Model 36 has a one-piece ribbed bed casting which provides support for the lower blade. Standard equipment includes a material hold-down bar that engages work before shearing begins, holds it in place during shearing and releases after cut has been made; a large work table with 50 tapped holes for mounting of side squaring gauge and protractor gauge; one set of four edge blades made of alloy tool steel, and an operating handle.

For additional information write to the company.

(For further details encircle index code 0511)

NEW KODAK MICROFILM

Eastman Kodak Company have announced a new 35mm. Microfile Print Film, which markedly improves the quality of positive film duplicates of original microfilm negatives.

In engineering drawing work, pioneered by Kodak's subsidiary, Recordak Corporation, the new film is expected to widen the use of aperture card systems for reproducing and distributing engineering drawings in industry and government.

For the first time, resolution of the new positive film matches the potential of the 240 lines per millimeter of original Kodak microfilm negative. Previously, positive print film had a potential resolution of only 150 lines per millimeter and this dropped to about 80 lines after printing and processing.

The new positive film preserves over 90 per cent of the original camera film resolution. Third generation negatives made from the positive film for distribution purposes are therefore much improved over previous materials.

(Continued on next page)

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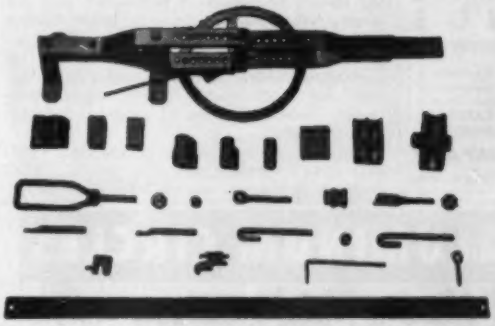

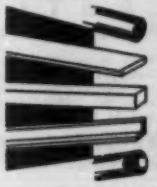

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SHOP EQUIPMENT NEWS

(Continued from page 49A)

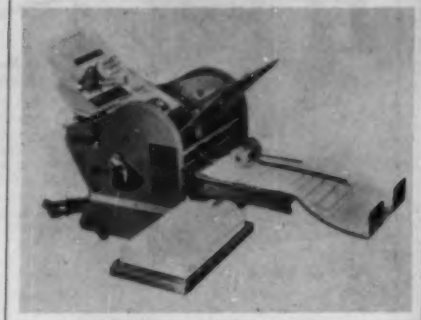
In industrial and government agencies, the new film assures higher quality third generation negatives used for reference and for reproduction uses in outlying repair depots and supply centers.

In addition to better drawing reproductions in industry and government agencies, now using the aperture card duplicating system, the new positive print film provides better reading quality in roll film records of newspapers, magazines, and books for library use.

(For further details encircle index code 0512)

CHALLENGE FOLD-MASTER

The Challenge Machinery Company have announced a new, small, fast folder, which will automatically feed, fold, and deliver sheets up to 9 by 14 in., at up to 7200 pieces per hour.



Challenge Fold-Master

Features of these new Challenge Fold-Master Units are: ease of setup and running even for inexperienced operators, positive friction feed, and heavy duty construction. A single lever quickly sets up the machine to feed any thickness from 12- to 100-lb. stock and even up to 5 stapled sheets. Most standard folds for all popular paper sizes are set up by moving the fold settings to the positions shown on the chart on the side of the machine.

The new units are designed to handle all the basic folding needs of offices, small printing plants, or duplicator operations. Also for larger plants wishing to free larger folding equipment for longer run work. They are available in two models: a standard unit for continuous folding operations, and a light duty unit for intermittent folding needs. Both models handle all types of single and double parallel folds.

Further information on prices, etc., available upon request.

(For further details encircle index code 0513)

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SPECIFICATIONS

Model	Interior Size	Wattage 100 AC-DC	F.O.B. Phila. Price
600	12"Wx12"Dx12"H	700	$ 90.00
602	24"Wx12"Dx12"H	1400	145.00

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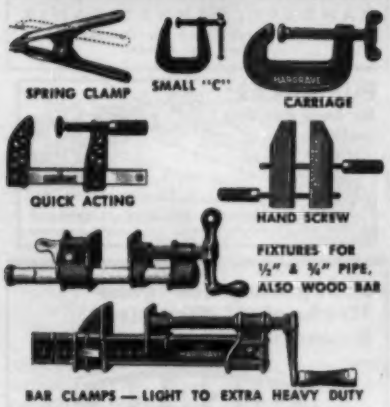

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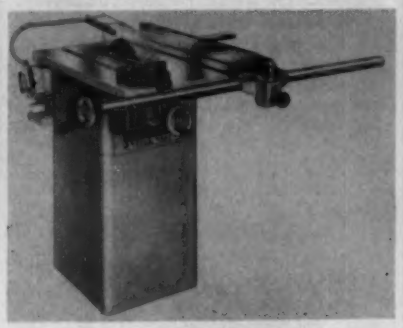
BOICE-CRANE CHALLENGER SAW

Using standard motors, the drive system adopted for the new Boice-Crane Challenger 10-inch Tilt Arbor Saw obsoletes all rolling-sliding pulleys previously employed on this equipment. The full-floating, frictionless, rolling motor drive delivers all the power to the blade. Constant belt tension is provided, and vibration and belt distortion and wear are reduced to a minimum.


Boice-Crane Challenger Saw

The 10-in. blades now retract fully below the table without added tension loads on the belt or bearing. More capacity to the gauges has been provided, and an improved, trouble-proof ripping gauge is another new feature, as is the auto-positive clamping which maintains split-hair accuracy.

The entire oversize undercarriage, from trunnion to saw-arbor housing, has been re-engineered for added strength, bigger shock loads, and stepped up power from larger motors. Bearings, likewise, are oversize.

Literature will be sent to anyone upon request.

(For further details encircle index code 0514)

STANLEY ALL-STEEL BRICK HAMMER

A new, all-steel brick hammer with an exclusive, plastic plug at the end of the handle butt for tapping bricks is now marketed by Stanley Tools, division of The Stanley Works.

The Stanley "Brickmaster"

The "Brickmaster" (SB 24) features a super heat-treated face and bit, precision forged, with face and top of head fully polished. The triple-alloy steel handle, fully heat-treated and chrome-plated, is permanently locked in the head and will not break in normal use. Neoprene grip, contoured and perforated for easy handling, absorbs shock and is protected from wear and tear by an exclusive plastic plug which locks securely into the handle butt without use of adhesives. Replacement plugs are available.

(Continued on next page)

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   by Battenberg, Sundberg, Paul
   88 pages. Wire-O-Bound. $2.95.
4. **Electricity and Electronics – Basic**
   by W. B. Steinberg, W. B. Ford
   256 pages. 406 illus. $4.50.
5. **Mathematics for Industry**
   by S. E. Rusinoff
   567 pages. 359 illus. $6.25.
6. **The Practical Dictionary of Electricity and Electronics**
   by R. L. Oldfield
   216 pages. Over 200 illus. $3.95.
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   by K. C. Graham (4th Edition)
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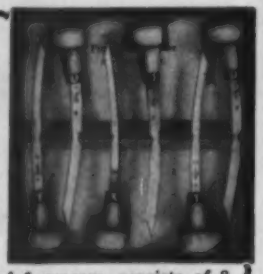

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SHOP EQUIPMENT NEWS

(Continued from previous page)

The Stanley "Brickmaster" weighs 24 ounces, and measures 11 5/16ths in. over-all. Further information available.

(For further details encircle index code 0515)

LOCKER BASE FOUR-STUDENT WOODWORKING BENCH

Parent Metal Products, Inc., have introduced their new Locker Base Four-Student Woodworking Bench No. 64-50-312B. This quality bench is 64 in. long, 50 in. deep, and 33¾ in. high with a 2¾-in. laminated edge

Parent Locker Base Four-Student Woodworking Bench No. 64-50-312B

grain maple top. The base consists of 12 box lockers (6 back-to-back), each 18 in. wide, 21 in. deep, and 10 in. high. The top has choice of wood or "Parent Structural T Iron," and bolsters, combination bench stops and dogs, and four vises.

For those interested a copy of Industrial Arts and Vocational Shop Equipment Catalog is available free.

(For further details encircle index code 0516)

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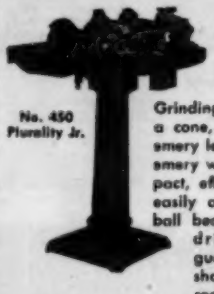

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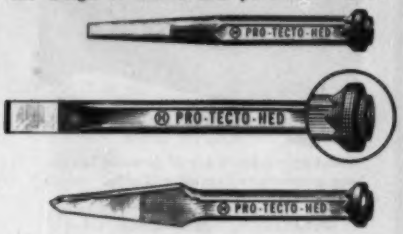
PRO-TECTO-HED CHISELS AND PUNCHES

The Cincinnati Tool Company, manufacturers of Hargrave Tested Tools, announces its new Pro-Tecto-Hed line of Chisels and Punches — for greater safety and for longer life. They are the first real improvement in the design of chisels and punches for more



Pro-Tecto-Hed Chisels and Punches

than 50 years. The raised "upset" head defeats "mushrooming" and chipping, affording greater safety and longer life. Trip-hammer forged from special analysis steel, each tool is tested for hardness and toughness before going into stock, and they comply with all Federal Specifications. Patents have been granted in the United States, and are pending in Canada, England, and Germany.

(For further details encircle index code 0517)

NEW GLENTONE SAFETY SPECTACLE

The Glendale Optical Company have introduced a new Tutone-frame safety spectacle which combines style and comfort with necessary protection, to meet the needs of plant management, personnel, visitors, and others not directly engaged in activities requiring heavier eye protection.

New Glentone Safety Spectacle

The new Glentone Safety Spectacle has a handsome two-tone frame of highest quality sheet stock cellulose acetate butyrate, and features a universal bridge which will fit more than 90 per cent of all users.

Interchangeable S7 lenses of No. 130 Glenrock superhardened glass are pierce and impact resistant giving maximum protection. Precision-made 7 barrel hinges eliminate temple rocking. Adjustable wire core spatula temples, ranging from 5½ to 7 in., provide added comfort for men and women alike.

The Glentone Safety Spectacle is available in eye sizes 44, 46, and 48 in the 7200 series, clear lens, or the F7200 series, with light, medium, or dark green lenses for ultraviolet and infrared potection.

The new Safety Spectacle is the latest addition to Glendale's ever expanding line of optical products for safety-minded industry.

(For further details encircle index code 0518)

ROCKWELL IMPROVED BAND SAW BLADE WELDER

Rockwell Manufacturing Company's Power Tool Divisions have introduced an improved Band Saw Welder, which welds up to ¾-in. blade widths.

The revised model features a factory set flash adjustment and improved jaw clamping

(Continued on next page)

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SHOP EQUIPMENT NEWS

(Continued on previous page)

New Rockwell Band Saw Blade Welder

adjustment, tension adjustment, and blade width indicator.

Designed for manufacturing operations that require large quantities of band-saw blades, the welder will cut and weld any length blade. Using coil stock and the welder, the manufacturer can greatly cut his band-saw blade costs.

The welder also features a blade shear and a grinding wheel for removing flash. Mounting brackets so the welder can be directly mounted to Delta and Walker-Turner band saws are available on request.

(For further details encircle index code 0519)

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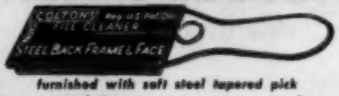

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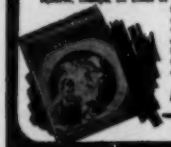

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Maid-o'-Metal aluminum, brass and copper circles, rectangles, foils and supplies are carefully prepared and selected for etching, tooling, engraving, and enameling. They include many new *pre-formed* items and metals in colorful hues. Subject to simple processes using tools designed for quick and easy development of skills, these products instill ease and assurance into your metalcrafting projects. Since 1949 Maid-o'-Metal products have been designed particularly for the requirements of teachers, schools, institutions, clubs, recreational groups, and individual hobbyists. They are available through dealers and through direct-mail orders.

A comprehensive set of Maid-o'-Metal literature is available from the manufacturers.

(For further details encircle index code 0520)

BLACK & DECKER ROUTER MANUAL

To guide the users of B & D Heavy-Duty Routers and to acquaint them with the proper techniques involved in using this versatile woodworking tool, The Black & Decker Mfg. Company has published a 44-page Router Manual.

Profusely illustrated and written in such a way as to be understood by both the novice and the professional craftsman, the B & D Router Manual enables the reader to get the fullest possible use of this complete woodworking tool. It covers: general operating instructions; freehand routing, dado and rabbit cuts; wood joinery, including tongue and groove, mortise and tenon, spline, and dovetailing; making your own moldings; sharpening bits and cutters; fixtures for accuracy in production; typical router projects; and the maintenance and care of the B & D Router.

Copies of this informative booklet available at 25 cents each.

(For further details encircle index code 0521)

NEW KODAK BOOKLET

Eastman Kodak Company, Business Photo Methods Division, have issued a new 16-page illustrated booklet describing modern office copying techniques.

Entitled "4 Versatile Office Time-Savers," the publication tells how organizations from trucking firms to hospitals are saving time and money with modern office copying systems.

It is available without charge.

(For further details encircle index code 0522)

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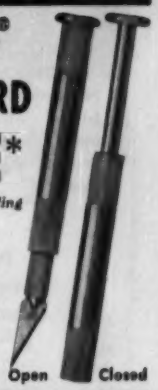

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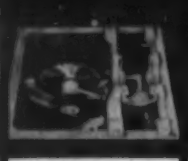

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